The Chemical Age

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The Collection of Fumes

ALTHOUGH it is now less than twenty years since electrostatic precipitation was introduced commercially into this country, Dr. Bush was able to put before the Institution of Chemical Engineers in his recent paper (reference to which is made on another page) an impressive account of technical development during that period. There are, of course, many methods of removing dust and small solid particles from gas, most of these involving some form of filter or wet treatment under particular conditions. Cyclones are a common form of dust arrester, and in general are suitable for particles larger than 20 microns (0.02 mm.) diameter. Wet washing systems are able to deal with still smaller particles, but they have two peculiarities which may or may not be advantageous according to circumstances. One of these is that the particles are suspended in water which must be clarified. The clarification may be nothing more than settling, or it may be filtration or some other special process. Or again, as in modern slurry treatment in coal-washing, it may involve electrolytic precipitation, if the minute particles form a colloidal solution.

The second peculiarity of wet-washing systems is that soluble gases are removed with the dust, and this may be useful or otherwise. Among such systems is the Howden-I.C.I. plant which is applied to power station gases. Dr. Bush has also applied electrostatic precipitation to these gases, and therein there is a nicely balanced problem which illustrates the considerations that may have to be taken into account. Dr. Bush points to numerous plants of this character in which the dust content of the cleaned gas is (as at Birmingham) reduced to 0.1 grains per cu. ft. In connection with other plants he mentions that the unburned carbon in the fly-ash may be from 1 per cent. to 40 per cent., and he refers to a Belgian station where this material which contained from 10 per cent. to 20 per cent. of carbon is fed back into the furnace and burned with an increase in thermal efficiency of 1½ per cent. and in addition it is converted into a sintered material for road making. In the Howden-I.C.I. system an efficiency of 98 per cent. is claimed, but here there seems to be no possibility of feeding back the ash if its carbon content should be high. On the other hand, modern power stations require to remove the sulphur dioxide as well as the ash, and this would be done by a wet washing process, but not by the electrostatic method. This is an example of a complex instance in which there would be doubt which process to employ for collection of fume, and whether the application of both methods would not be the most advantageous procedure.

In very many instances, however, there is no such doubt, and unquestionably electrostatic precipitation has been a boon to industry. Practical experience confirms Dr. Bush's claim that once the apparatus has been adjusted it seldom needs attention, and in an important piece of electrical equipment that is a most valuable consideration. It is interesting to observe from the paper in how many instances the adoption of electrostatic precipitation has done more than its original work and has led to increase of output or to other important advantages.

The principal additional advantage has been in the direction of increased output. A precious metal furnace was able to refine £5,000,000 worth of metal in the course of a rushed week-end; the aluminium industry has found that in the calcining of alumina the throughput of the furnaces has been considerably increased as the carry-forward of the dust is no longer a bar to forcing them; it has brought about a new development in roasting practice since the formation of dust matters not at all and the rate of roasting is now increased to give the maximum dust formation, instead of the minimum as formerly; finely-divided pyrites are now "flash-roasted," a development impossible previously; the Cowper stoves of blast furnaces have been re-designed and improved in efficiency; the regenerators of coke ovens fired by producer gas do not block up so quickly; the recovery of tar by electrostatic precipitation has improved the subsequent recovery of benzole by preventing thickening of wash oil and has prevented tar from settling on the oxide used for gas purification. Thus does one technological development bring about others.

The process seems to be most suitable for the finest dusts, such as may be termed "fumes." The greater portion of the dusts collected appear to be below 20 microns in size. In one instance 75 per cent. were below 10 microns (0.01 mm.); in another the bulk was 5 microns, much being below 3 microns; while the successful treatment of smelter fume is mentioned in which most of the particles are below 3 microns and very difficult to treat in any other way. The power costs are moderate, and examples given by Dr. Bush are 0.5 to 1 kWh per 100,000 cu. ft. of gas cleaned. For tar precipitation the figure given is just below 1 kWh; for two-stage cleaning of blast furnace gas, 2 kWh; for one-stage cleaning of blast furnace gas, 3 kWh, all per 100,000 cu. ft. of gas; for pyrites roaster gases, 2 kWh per ton of ore roasted.

An interesting point is that whereas most plants are content with avoiding ordinary nuisance, the electrostatic plant has had to avoid another nuisance unthought of when first introduced—that of wireless interference. The developments of the period under review have been mainly in respect to the electrical equipment and to extending the usefulness of the process; the history of electrostatic precipitation reflects great credit on Dr. Bush and his colleagues.

Notes and Comments

Professional Status

ACTION taken by professional bodies with the object of maintaining and improving the status of their individual members are of interest to other professions as they can in some cases suggest advantages which might be gained by a similar effort. As a result of an impression that a movement towards some form of organisation for furthering and protecting the interests of engineers would be welcomed and supported by that profession generally, a meeting was held towards the end of last year at which such subjects of fundamental interest as the formulation of standard scales of salary, guidance for prospective entrants to the profession, and the desirability of a united body of engineering opinion in relation to public affairs, were discussed. As a result a committee was set up to investigate the possibility of improving the status of the engineer and its report is due in about three months' time. The subjects discussed are those of vital interest to all professions; the way in which the engineers are tackling them are worth consideration. Conditions are obviously different in the chemical profession, but it is a useful reminder that co-ordination between the different chemical bodies, on matters affecting the whole profession, is most desirable.

Unemployment

ANOTHER topic of primary importance to a profession, and incidentally one which does not appear to come within the scope of the engineers' discussion, is unemployment. So far as the chemical profession is concerned, the unfortunate consequences of unemployment find a certain degree of alleviation in the benevolent fund and insurance scheme, which have been most praiseworthily established by different chemical bodies. Although, owing to the satisfactory nature of trade, the number of unemployed chemists is at the present extremely low, it might be worth while considering the methods by which unemployment in the industry could be reduced in any future contingency. Such work would, of course, be additional to that of the benevolent funds, but it would strike at the root cause of the trouble. Here again, co-operative effort would be the most valuable approach to the question. The basis for co-operation already exists in the Chemical Council and it is to be hoped that in the extension, which must of necessity be gradual, of the council's activities, a point will be reached where major questions affecting the profession as a whole will be discussed in order to reach issues of greatest benefit to all.

Safe Water Supplies

CROYDON'S typhoid epidemic, and the report setting out the results of the subsequent inquiry, have been a jolt to the minds of the public. The purity of the water delivered to the consumer had come to be taken for granted and, although it was vaguely felt that occasional cases of water-borne diseases did occur, there was little belief that a disastrous epidemic could occur in this year of enlightenment. Even more disturbing was the statement in the report that there was misunderstanding and lack of communication between the officers responsible for the water supply and further that the supply was not under the direction of a fully qualified water engineer. The immediate result of the publication of the report was to cause members of the general public to ask themselves whether their individual water supplies were under similar control. Reassuring letters have been published in the daily Press recently from large water companies in different parts of the country describing the care which is taken in safeguarding the purity of water they supply to the public. It is significant, however, that little stress is laid in these letters on frequent analysis, and on the desirability of setting up a legal standard of water purity; two points upon which we have commented in these columns recently. However, the former chemist-in-chief of the L.C.C., J. H. Coste, puts the matter in a nutshell in a letter published in the *Daily Telegraph and Morning Post*. He suggests that those dependent on public water supplies throughout the country should be given at least as efficient protection as gas consumers. Gas companies are obliged to declare the quality of gas which they intend to supply in their districts, and officials are appointed to make such tests as reasonably ensure that the quality is maintained. A chief gas examiner receives returns of all tests and gives judgment in cases of default. He adds that it is necessary that some central authority should set up standards of purity for all supplies of water for which charges are made, and should see that tests are made at suitable intervals.

A Case for Export Subsidy

SPEAKING at the annual meeting of the Bradford Dyer's Association on Monday, Mr. George Douglas, chairman of the Association, referred to means for improving the export dyeing trade. The reduction of costs by concentrating the industry in fewer factories was only the first step. It is essential to be able to sell at competitive prices and to arrive at this position the industry should be prepared to forgo on exported goods some of the overhead costs. In building up and developing an industry in a new country two weapons were almost invariably used—first, protective duties to secure the home market, then, in order to expand into neutral markets, the free use of subsidy in one or more forms. Mr. Douglas pointed out that we have not been slow to use one of the weapons of our competitors in protecting the home market, there did not seem to be any reason why we should hesitate to use the other to expand the export market by bearing ourselves the cost of our fortunate circumstances and not charging it in the price of what is supplied in competition with the rest of the world.

Annual General Meeting of the Institute of Chemistry

THE report of the Council of the Institute of Chemistry submitted to the annual general meeting on Tuesday shows still further substantial increases in the numerical and financial strength of the Institute. Up to January 28 last, the number of members had increased by 217, and that of registered students by 18, as compared with the position on the same day of 1937. Entries for the associateship and fellowship examinations totalled 187, of whom 93 passed. In 1936-1937 the total number of candidates examined was 193, with 85 passes. At present the roll of fellows and associates stands at over 7,000. An indication of the Institute's continued active participation in matters of public and professional interest is given by the large number of conferences and committees on which it was represented. The local sections carried out comprehensive programmes of meetings, both social and for the reading of papers, and works visits; a new section being formed during the year for East Anglia. The ninth edition of the list of "Official Chemical Appointments" was published in November among the other activities of the Publications Committee.

Some Applications of Electrical Precipitation to Industrial Effluent Gases*

By

H. J. BUSH, M.Sc., Ph.D.

NEARLY twenty years have gone by since the first large-scale installation—or small-scale for that matter—embodying the principle of electrical precipitation was laid down in this country, and so it may be opportune to review the progress made during those years and see where we stand to-day. It is interesting to note that the first application in England was for the purpose of removing a nuisance and not for the recovery of valuable metalliferous flue dust which helped so much in getting electrical precipitation launched in the United States of America and has since continued to be a strong incentive to the use of electrofilters in the metallurgy of non-ferrous metals in the North and South American continents.

In Great Britain it was found that the scope in this field was much more restricted, and so we find that the volume of gases treated for the recovery of values in this country to-day is an insignificant fraction of the total volume of effluent gases from industrial furnaces that pass through electrofilters before escaping to atmosphere. The majority of effluent gases from industrial furnaces are accompanied by solid and/or liquid particles carried in suspension. Such entrained matter, though normally consisting of dust and fume particles of excessively small size, amounts in practice to a very large weight of material passing to atmosphere by way of a works stack.

Briefly stated, an electrical precipitator consists of a " discharge " electrode of a relatively small radius of curvature (*e.g.*, a wire) and a " collecting " electrode of extended surface (*e.g.*, a plate or a pipe) between which the gases carrying solid or liquid particles are passed. The discharge electrode is usually negatively charged, while the collecting electrode is maintained at earth potential, and a unidirectional high-potential electric field is established between the two.

Industrial Applications

Generally speaking, there are three classes of conditions which create the need for dust separating equipment :—

(i) Where the abatement of a dust nuisance is the primary consideration. Under this head are included Power Stations (especially if pulverised fuel is burnt) and cement making.

(ii) Where valuable material is carried to waste by effluent gases. Instances of this are metal smelting or refining operations, and the calcining of alumina.

(iii) Where the gas itself is to be cleaned for subsequent use, irrespective of whether there is any value in the separated material or not. Examples of this category are blast-furnace gas and coke-oven gas.

The figures below indicate the small size of particles often met with in practice. They are the results of determinations made with an elutriator on dust caught in a Lodge-Cottrell electrofilter installed at a power station where pulverised fuel is burnt :—Dust particles smaller than 20 microns 94 per cent., dust particles between 20 and 10 microns 20 per cent., dust particles between 10 and 5 microns, 65 per cent., dust particles smaller than 5 microns 10 per cent. A considerable quantity of dust is below 1 micron in size.

The electrode system of an electrofilter may take a variety of forms according to the nature of the particles to be precipitated and the characteristics and temperature of the effluent gases. Thus, the collecting electrodes on which the material is deposited may consist of plain or corrugated plates or may be composed of rows of separate rods of small cross section closely spaced to form a series of curtains. The last-named is known appropriately as the " rod-curtain " type and it has been developed specially for use with high-temperature gases. This design facilitates a quick deposition and removal of dust, for it lends itself to a specially efficient rapping mechanism. Moreover, the independent rods are not liable to deformation and buckling with high temperatures. Other forms of collectors have been built with pocketed recesses into which the dust is driven under the influence of the field and allowed to settle in a quiescent atmosphere outside the moving gas stream. The pockets may be connected by closed ducts to collecting hoppers so as to prevent the dust being whirled back into the gas stream during the rapping period.

The discharge electrode system normally takes the form of a series of metallic wires of suitable composition which are arranged to hang centrally between the collecting electrodes. The discharge electrodes are supplied with high-tension direct current at a potential suitable for the special needs of each installation, the potential being normally of the order of 50,000 volts. Ordinary works' low-tension electric supply, either A.C. or D.C., is brought to the control panel. If the supply is A.C., which is preferable, it is stepped up by a special transformer to the required high potential. If only D.C. is available, a small motor-generator is provided to give the A.C. necessary for the transformer.

There are two district types of rectifier normally employed for converting high tension A.C. into D.C. :—

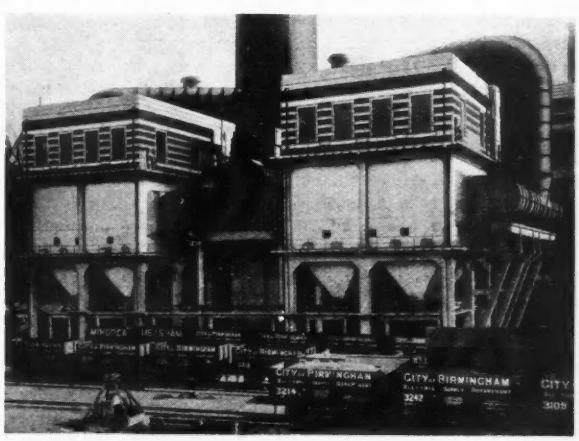
(i) *Mechanical (rotating) rectifier.* This is of very simple and robust design and consists of a disc rotated by a motor in synchronism with the electric supply.

(ii) *Static, or metallic oxide type of rectifier.* In this type there are no moving parts, sparking contacts or commutators, and the rectifier itself is entirely oil-immersed and enclosed in a steel tank.

In collaboration with the Post Office Engineering Department wireless interference has been eliminated. The equipment comprises high ohmic resistance chokes and metallic screens for those parts liable to emit interference. This effectively prevents any disturbance to wireless reception.

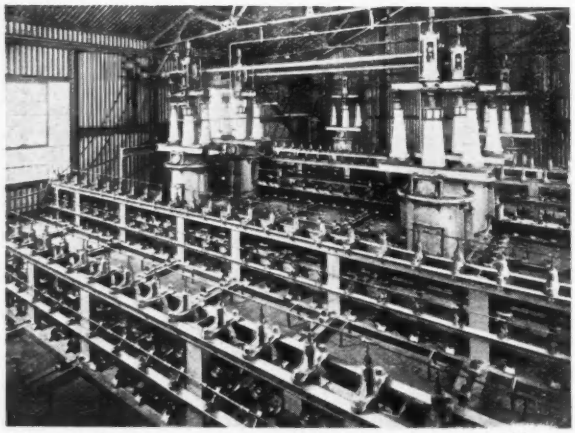
Plants in Operation

The hot dust-laden gases from rotary cement kilns are passed either through earthed mild steel pipes with discharge wires suspended axially therein or through chambers built of mild steel or concrete in which earthed plates are suspended alternately with rows of charged wires. The plates form a



An external view of electrostatic precipitators made by Lodge-Cottrell, Ltd., installed at Hams Hall power station, Birmingham.

* Extracted from a paper read at the Annual Meeting of the Institution of Chemical Engineers on February 18.



The rapping gear on top of a Lodge-Cottrell electrofilter.

series of parallel ducts through which the gases are passed and underneath are arranged hoppers with conveyors for emptying the collected material. On some cement works, where the conditions are suitable, the dust separated in the precipitator is returned to the kiln.

A few years ago the Electricity Commissioners appointed a special Technical Committee to consider the measures which have been taken in this country and abroad to obviate the emission of ash and grit from the chimneys of electric power stations. A great deal of work was done and a report was published. Their finding in regard to the dust problem was that with installations fired with pulverised fuel, some form of dust extraction plant is a necessity, and that of these the most suitable type is the electrical precipitator. The largest electrical precipitator installed in any power station in this country is in operation at the Hams Hall Generating Station at Birmingham. This installation handling the flue gases from 8 pulverised fuel-fired boilers is of the rod-curtain type, and it consists of eight independent units, each with inlet and outlet shut-off dampers. The shells are of reinforced concrete construction. At maximum boiler output, the total volume of gas passing into the dust precipitator amounts to 880,000 cu. ft. of flue gas per min. at a temperature of about 310° F. The dust content of the cleaned gases leaving the precipitator is remarkably low, namely, 0.10 grains of dust per cu. ft.

Probably the largest electrofilter installation for dealing with combustion gases is the one at the Leuna Werke. The gas volume dealt with is 2,300,000 cu. ft. per min. and enough dust is collected in 24 hours to fill fifteen 10-ton railway trucks.

Recovery of Valuable Material

It is not always realised what a large sum of money may be represented by the metallic values carried away with the effluent gases from a refining or smelting furnace. Electrical precipitation is particularly suitable for the recovery of fumes from metallurgical operations, for practically no back pressure is exerted to upset correct furnace conditions or necessitate a powerful fan. The gases can be treated at a temperature sufficiently high to avoid corrosion danger from the sulphur dioxide, and occasional trioxide, found in most smelter gases.

The following is a partial list of some of the substances which are being recovered by electro-filters:—Alumina from rotary calcining kilns, arsenic from roasting gold concentrates, tin, copper, lead, silver and antimony from smelting operations, gold chloride from the refining of bullion, nickel oxide from calcining furnaces, barium sulphate, lead sulphate, and zinc oxide. The aluminium industry has found the electrofilter a very useful adjunct to the rotary furnaces in which hydrate of alumina is calcined to alumina. It has led to the throughput of these furnaces being considerably increased as the carry-forward of dust is no longer a bar to forcing them.

The most important example under this heading is found in the iron and steel industry where, in the smelting of iron, some 50 per cent. of the carbon in the coke fed to the blast furnace appears as a combustible constituent of the effluent gases. With the gases discharged from the top of the furnace, large quantities of fine ore dust, coke and ash are carried forward by the blast. This dust may amount in some instances to as much as 20 or 30 grammes per cu. metre, though normally, it is of the order of from 5-10 grammes. Much of it is of extremely small size and the finest particles contain the more volatile alkalis, which are always present in blast furnace dust. Often metallic fumes are also found due to small quantities of lead and zinc that occur in some iron ores.

Unless efficient means are adopted to remove the finest as well as the coarser dust from the gas, serious damage is done by the action of the alkali fume on the chequered brickwork lining and packing of the Cowper stoves used for heating the blast. Another reason for fine cleaning blast furnace gas lies in the tendency towards a reduction in the number of Cowper stoves per furnace and closer packing of them. Both these desirable improvements are rendered possible by the use of electrofilters.

Methods of Obtaining Clean Blast Furnace Gas

In modern works, coke ovens are generally combined with the furnace plant and steel works and if there is a sale for a surplus of valuable coke oven gas, fine clean blast furnace gas of lower calorific value is used to heat the coke ovens. Here, too, the design of modern settings and burners demands the use of clean gas only; and if the blast furnace-gas is to be used in the steel works, it must be clean and as free from moisture as possible. There are two alternatives for achieving this end by electrical precipitation, the choice depending largely on the conditions of the water supply at the site and the facilities for disposing of large quantities of thickened slurry. Either the hot dirty gas is taken through a cooling tower to bring the gas temperature down to roughly 25° C. and then the remaining dust and water particles are removed in suspension in a wet type of electrofilter; or the gas is first cooled in an empty water-sprayed tower to approximately 80° C., and then passed through an electrofilter of the dry type where the greater part of the dust is precipitated—then the gas is passed through a packed slat cooler to reduce its temperature to about 25° C. and, lastly, the small traces of dust remaining, and particularly the entrained water particles and fog, are completely removed in a wet type of precipitator.

In the first case, with a packed cooling tower, the dust is brought down in the form of a slurry and if water is valuable the slurry must be thickened in the conventional type of thickener. In the second method only a relatively small amount of slurry comes from the preliminary cooler and the final wet precipitator, while the greater part of the dust is recovered in a dry condition. The cooling water from the slat cooler is, to all intents and purposes, clean and can be passed over a cooling tower without previous settling and returned into the circuit. The advantage of the second method, usually referred to as the "two-stage process," is that the make-up water that has to be added to balance the loss of water from the plant is comparatively small. It has the further advantage of greater elasticity over the first method. There is no difficulty with the two-stage process in maintaining an average as low as 0.002 grain of solids per cu. ft. or 5 milligrammes per cu. metre.

Determination of Minute Quantities of Dust

It may be asked how such minute quantities of dust as are left in the clean gas are determined. Spot tests are taken periodically by means of a special filtering set comprising filter paper thimble in a brass holder that can be heated to prevent condensation, small motor-driven exhauster, gas meter and Pitot tubes. The best indication of the performance of the electro-filter when working down to these low limits is the colour of a pilot flame burning clean gas. If fine-cleaned to 5 or 6 milligrammes per cu. metre the flame is a perfectly clear pale blue, and immediately the dust content goes above this it shows a reddish-yellow tinge. It is an extraordinarily sensitive indicator.

We now pass on to another example of gases that are cleaned prior to further use. The sulphuric acid industry was one of the first to adopt electrofilters, having long sought a means of efficiently filtering the dust out of the pyrites roaster gases before they enter the Glover tower. Practically from the start the experiment was successful and few difficulties were met with, so that to-day every mechanical furnace of any size uses electrofilters.

In contact acid plants the electrofilter is unequalled for removing the last traces of acid mist, arsenic, and volatile chlorides from the SO_2 gas stream after cooling to 30°/40° C. and preparatory to its entering the drying towers. Attempts to use electrofilters as adjuncts to the SO_3 absorption system have not been particularly encouraging.

Summary of Progress in the Art

And now, having given an outline of the present state of the art, let us see what progress has been made in the twenty years since commercial installations began to be built. First and foremost the electrical equipment has been much improved and is now as reliable as any other, breakdowns on transformers and rectifiers being very rare. It is now known how to screen off and damp out wireless interference, and instead of bare conductors for connecting the generating sets to the electrofilters specially insulated heavily armoured cables are used; these are easier to install, safer to use, and do not require any screening to guard against wireless interference. Not many startling developments have been made in respect of the electrode system, attention mainly having been given to standardising the electrodes as far as possible and avoiding fancy designs, the higher cost of which is not always justified by their performance. Rapping gear has been much improved; on large units both electrodes are rapped mechanically at prearranged intervals.

Electrical precipitation cannot yet be termed a science; it is still an art, and likely to remain so until the individual parts played by the many factors present together in the electrical field have been sorted out and determined with sufficient accuracy to enable us to dispense with empirical values. What is being done to-day is intelligently to correlate the voluminous data obtained from actual working conditions with the potential gradient of the high tension current, the time of exposure, the linear gas velocity, and other factors, and thereby to establish constants to enable plant to be designed for any required degree of dust recovery for any one type of gas.

Reduction of Nitrobenzene

Efficiency of Catalysts

THE catalytic reduction of nitrobenzene to aniline in the vapour phase by cobalt oxide, alone and mixed with other oxides, has been studied by Griffiths and Brown (*J.P.C.*, 1938, *42*, 107-111).

Pure cobalt oxide prepared by precipitation of $Co(OH)_2$ from cobalt nitrate solutions, and furnaced at 280° C, gave very poor conversions—the maximum yield was 36.2 per cent., and the conversion was very adversely affected by using asbestos as a support. A cobalt-manganese catalyst, prepared by Salinger's method from cobalt nitrate, potassium permanganate, excess of hydrogen peroxide and sodium carbonate to reduce the acidity, furnaced for two hours at 280° C., gave yields of up to 99 per cent. when unsupported. The optimum temperature was 260°, but the catalyst was very sensitive to temperature changes, and if previously used at a lower temperature, would not give such good results at a higher temperature as it would have done if used at the higher point straight away. The use of an asbestos support was again found deleterious. Cobalt molybdate, dried for three hours at 330° C., gave quite good conversions of up to 89 per cent., at the optimum temperature of 320°. Several cobalt-chromium combinations were tried, but none of them gave really satisfactory results.

Electric Power from the Grid

A Matter of Interest to Works Owners

A MOTION of wide interest to works' owners using electric power from the grid system came before Mr. Justice Simonds in the Chancery Division, when British Celanese, Ltd., asked for an interim order against the Derbyshire and Nottinghamshire Electric Power Co. that the Celanese factory at Spondon, Derbyshire, should be supplied with electricity only from an isolated generator, " or by such other means as should be practical to minimise the nuisance or damage at present existing through the defendants supplying electricity in such a way as not to prevent a ' fault output ' in excess of the existing safety capacity of the protective apparatus in the factory."

Mr. W. P. Spens, K.C., for British Celanese, Ltd., said there was an old-standing dispute between the parties, but it had come to a crisis because the factory inspector had told Celanese that they would be prosecuted unless something was done at once to deal with the trouble. Every consumer of electricity was liable to receive a " surge " from the power company supplying it, and safety apparatus had to be installed. " It is the electric company's liability to take the necessary steps to control the current at their own power station to protect us from any excessive surge." The defendants had offered to contribute £30,000 towards the cost of installing stronger switches in the Celanese factory, but the offer was not accepted. The cost would be between £100,000 and £120,000.

Mr. Raymond Evershed, K.C., for the Derbyshire and Notts Electric Power Co., submitted that no interlocutory injunction ought to be granted and said that, under the grid scheme, the Central Electricity Board were the suppliers and not his clients.

Soya Bean Supplies

First Commercial Harvest in England

SOYA beans are now being grown in England for the first time on a commercial basis. The Soya Bean Cultivation and By-Products, Ltd., near Oxford, sow 23 acres of land with soya beans last spring, and the harvest was threshed recently in the presence of Ministry of Agriculture officials.

Mr. J. L. North, former curator of the Royal Botanical Society of London, began to experiment with the soya bean more than thirty years ago. It had previously been grown in hot and dry climates suitable for maize and cotton; but Mr. North's researches revealed four varieties which grew in England and which have gradually become acclimatised. These four varieties are being grown in Oxfordshire to-day.

Last year the United Kingdom imported approximately 150,000 tons of soya bean oil, and 170,000 tons of soya beans. The beans contain 18-20 per cent. oil, which is easily made edible. The oil meal contains albuminoid properties and is especially valuable for feeding to dairy cattle, causing an increase of secretion of milk fat. At present, the United States has 7,000,000 acres under the soya bean after twenty years' expansion.

Soya beans have been cultivated successfully, on an experimental basis, in Perthshire, Glamorgan and Cumberland, but the Eastern Counties should provide the most favourable conditions for its cultivation, since it thrives best in warm and dry conditions. This year, the company are planting 1,000 acres; next year they will plant 2,000 acres; in 1940, 10,000 and in 1941 100,000. An acre of land can be sown with 30 lb. of seed; it produces 1,000 lb. of seed, in a fair harvest. Within five years, it should be possible to raise in this country a million acres of soya bean, by which time Great Britain should have rendered herself independent of soya bean imports.

The cheapness of Oriental labour largely counteracts the effect of the 20 per cent. ad valorem duty on imported beans and soya oil.

Organised Research

Informal Discussion at B.C.P.M.A. Annual Dinner

THE annual dinner of the British Chemical Plant Manufacturers' Association was held at Le Trianon, Jermyn Street, London, S.W.1, on February 21, with Mr. J. H. G. Monypenny in the chair.

Following dinner, Dr. A. P. M. Fleming gave an informal talk on the organisation of research in a works. He said that about twenty-five years ago there were only about half a dozen concerns in this country which had established research organisations. At the present time we are, in the main, as well equipped as any other country in the matter of research, although some of our industries still lag behind. Looking backward over these twenty-five years there were certain features which stood out. Among these the rise in the standard of living and the application of fine methods of measurement to industry were noteworthy, but most significant of all was the general quickening of industrial energy. In essentials, research, so far as it concerns the individual industrial manufacturer, is the improvement of the finished product which he turns out. Anything which works this accomplishment can be termed research.

There are different types of research:—Investigation of problems associated with materials, and keeping abreast of new materials introduced; research on processes, plant, and the business side, together with market development. In addition to these there was pure research which at the time of its undertaking has no immediate commercial objective. Allied with these types of research there were also investigations carried out for the benefit of the customers. Dr. Fleming stressed the value of co-operation between manufacturer and user and gave as an example the case of a manufacturer of press boards, made very cheaply from wood pulp. It would appear at first sight that a product of this nature had already reached finality as far as improvement was concerned. But the manufacturer approached an electrical company for possible co-operation and as a result developed a new material which, although it was twice as expensive as the press board, was many times better.

It was of major importance to ensure that the right type of worker was engaged in research and it was equally important to cultivate an atmosphere in which it was felt that a worker on the process plant could describe his difficulties to the research department without feeling at the same time that he was displaying his own ignorance. Finally, Dr. Fleming stressed that the state of industry was not static, but dynamic and that the greatest assets that a company could have lay in the things which they did not know, but were well equipped to find out.

In the discussion that followed, Dr. William Cullen said that it was, in his experience, with very great difficulty that anything novel was published. In America and Germany conditions were very much better as regards the publication of novel research.

Mr. E. V. Evans said that the organisation of research should be so arranged that the greatest encouragement was given to research by the young chemist, for he would have to be trained to take his ultimate place as a research leader. Mr. J. Arthur Reavell pointed out that research was carried out by three different classes of bodies: Government, research associations, and private organisations. He said that the patent question was one of great difficulty; big organisations could create a virtual patent monopoly of a particular subject.

Others who contributed to the discussion were:—Mr. D. E. Roberts, Dr. J. Vargas Eyre, Mr. A. J. S. Horton, Mr. I. E. Weber, Dr. C. H. Clarke and Mr. A. C. Branch.

Among others also present were:—Mr. B. L. Broadbent, Dr. T. A. Durrans, Dr. G. E. Foxwell, Mr. F. A. Greene, Mr. H. Hollings, Dr. R. Lessing, Mr. R. Marsh, Mr. J. Davidson Pratt, Mr. S. J. Ralph, Mr. B. N. Reavell, and Dr. R. Seligman.

Letters to the Editor

Long Tubes in Evaporators

SIR,—We have read with considerable interest the various articles on Works Maintenance in your issue of February 12.

There is, however, a statement by Dr. J. P. Bar to which we would like to refer. The criticism of the use of long tubes in evaporators shows a woeful ignorance on the part of the writer of the article. Anyone with experience of the use of both long and short tubes knows quite well that with modern cleaning devices the long tube is much easier to clean than the short tube.

In the calandria type pan with short tubes, the operator has to work inside the pan in a very confined space and under unpleasant conditions, particularly if the tubes are being cleaned immediately after a run. With the long tube type, the operator is working in the open air and the cleaning of the tubes is not only very simple, but is performed in a fraction of the time for the same surface.

There is a point of considerable importance in regard to the long tube as against the short, namely, that there are a quarter of the number of tube joints in the long tube compared to the short, so that the liability for leakage and maintenance troubles is materially reduced; not only so, but the possibility of taking care of expansions and contraction is much more simple in the long than in the short tube.

As makers of short as well as long tube type evaporators, and with vast experience in long tube apparatus, we feel that we must challenge the very misleading paragraphs containing the expression "cheap design," an expression which seems to be quite out of place in a technical article.—Yours faithfully,

BRIAN N. REAVELL,
Kestner Evaporator and Engineering Co., Ltd., Director.
5 Grosvenor Gardens, Westminster, S.W.1.
February 25, 1938.

International Management Congress

An Opportunity to Study American Conditions

FOLLOWING on the successful congress held in London during July, 1935, the 7th International Management Congress will take place in Washington, September 19 to 23, under the auspices of the International Committee of Scientific Management, of which Viscount Leverhulme is president. It is expected that over 2,000 persons will be present, representing about thirty countries. The congress is being organised by the National Management Council of the United States, and is receiving extremely strong support from American industry. Two main themes will be discussed at the congress, namely, "Recent Developments in Management" and "The Social and Economic Aspects of Management." In addition to the congress itself, three congress tours are being organised covering respectively New England (September 8-13), the Central Atlantic Coast States (September 14-18), and the Middle West (September 24-October 4). These will provide an exceptional opportunity of studying closely the management of some forty well known industrial and commercial concerns. Further information about the congress can be obtained from the secretary, Mr. U. Baliol Scott, the British Management Council, Room 68, Armour House, St. Martins-le-Grand, London, E.C1.

A company has been formed, under the style of Comptoir des Gaz Industriels, to undertake the production and marketing of petroleum gases and their derivatives. Participating in the concern are the Standard Francaise des Pétroles, the Pétrole Jupiter, the Soc. Générale des Huiles de Pétroles, the Compagnie Industrielle des Pétroles, the Société pour l'Utilisation Rationelle des Gaz, and Anciens Etablissements Liotard Frères.

Micro-Chemical Methods in the Laboratory

Evidence of a Growing Interest

THE Belfast and district section of the Institute of Chemistry held a symposium on micro-chemical methods at Queen's University, Belfast, on February 15, in collaboration with members of the University Departments of Chemistry, Bio-chemistry and Agricultural Chemistry. A large attendance of members and guests testified to the interest which chemists are taking in micro-chemistry.

Development of Micro-Chemistry as a Science

Dr. C. L. Wilson opened the meeting with a short general address on the subject of micro-chemistry. He traced the development of micro-chemistry during the present century into a fully-fledged branch of science with its own tradition, technique and journal. He mentioned the important part which personal contact with the great masters, such as Pregl, Emich and Lehmann, had played in this development. He next briefly described the scale of micro-chemical operations, the nature of the special apparatus used—in particular the micro-chemical balance and the microscope—the special reagents employed in addition to the ordinary qualitative reagents and the economy of time and material to be effected by the adoption of micro-technique. His remarks were illustrated by photomicrographs showing various typical micro-chemical tests for metals.

The audience proceeded to the laboratories for a series of representative demonstrations. A wide range of standard micro-chemical apparatus was displayed, including the Pregl micro-Kjeldahl apparatus, the Pregl micro-Dumas nitrogen train, filtration apparatus and apparatus for conducting distillation and steam distillation on the micro-scale. The Kuhlmann micro-chemical balance was explained to successive parties in the special balance room, although under the circumstances actual weighings could not be demonstrated.

Dr. Andrews had arranged a most interesting demonstration of optical apparatus employed in micro-chemical work. This included a Spekker photo-electric colorimeter, a Leitz "Universal" colorimeter fitted with micro-plungers and cups, another Leitz "Universal" colorimeter fitted as a micro-nephelometer, a standard Duboscq pattern colorimeter, a B.D.H. pattern Lovibond tintometer with artificial daylight attachment, a Zeiss direct vision micro-spectroscope fitted for observations on the oxidation and reduction of cytochrome, a Leitz micro-polarimeter, and a Hartridge reversion spectroscope fitted for observations on the absorption bands of blood pigments.

Simple Separation of Silver, Lead, and Mercurous Mercury

Mr. Toms demonstrated a simple separation of silver, lead and mercurous mercury using one drop of solution and eliminating filtration by the use of capillary tubes. The drop is treated on a microscope slide with one drop of hydrochloric acid. The slide is warmed, and the solution of lead chloride removed in a capillary and transferred to another slide. The lead is precipitated with potassium iodide and the lead iodide crystals are identified under the microscope. The residue of silver chloride and mercurous chloride is then washed with water, warming and removing the wash water by means of a capillary and thus freeing the residue from nearly all lead chloride. The residue is then treated with ammonia solution, and the ammoniacal silver chloride solution is transferred to a cover slip, where it is evaporated and the silver chloride crystals identified under the microscope. The blackened mercurous residue is washed with water, and transferred by a wide capillary to a quartz spatula, whence it is sublimed on to a cover slip. The sublimate is treated with bromine water, excess being removed by evaporation, and a characteristic Nessler brown developed by addition of caustic soda and ammonia.

Dr. Wilson demonstrated his modification of Middleton's method (*Analyst, 40,* 154) for the identification of the elements in very small amounts of organic compounds. The neatness and simplicity of the method suggests that it might well replace the much less convenient sodium fusion generally employed in the examination of organic compounds by Lassaigne's method.

Volumetric work was also represented in the demonstrations. The Conway horizontal micro-burette (*Biochem. J., 22,* 283) was used to show the ease with which titrations can be carried out using weak acids and alkalies (N/1,000 and weaker). The total capacity of this burette is only 0.25 ml. the burette tube being graduated into 0.001 ml. divisions. Nevertheless the burette is extremely convenient in use. It is best used in conjunction with the Conway micro-absorption unit (*Biochem. J., 27,* 419) and it is advisable to make up the acid solutions as recommended by Conway.

Wigglesworth's Micro-Volumetric Technique

The elegant micro-volumetric technique of Wigglesworth (*Biochem. J., 31,* 1719) was demonstrated by Dr. R. H. Common. This technique exemplifies the extraordinary results which may be achieved using very simple apparatus. In the demonstration volumes of 0.5 per cent. silver nitrate of the order of 0.003 ml. were quantitatively titrated with N/100 ammonium thiocyanate. The burettes and pipettes are made from fine capillary tubes lined with paraffin wax, and the titration is performed on a single drop which rests on a paraffined microscope slide and is spun rapidly by a filtered air jet to secure mixing during titration. The burettes and pipettes are calibrated in arbitrary units, and a set of burettes and pipettes are standardised by carrying out a determination on a known solution.

Leak of Gasworks Effluent

Buxton Corporation to Pay £100

BUXTON CORPORATION were fined £25, with £85 costs, at the local police court recently, for knowingly permitting liquid matter to flow into the River Wye to such an extent as to cause the waters to be injurious to fish, between November 18 and 22.

Mr. Norman Winning, prosecuting on behalf of the Trent Fishery Board, said that as a result of pollution by gas liquor from the Corporation's gas works the river was poisoned for miles down, and 1,200 fish were taken up dead.

Mr. A. W. Mawer (defending) said that a leak occurred in a pipe connected with one of the tanks in which the gas liquor was stored. While the leak was being repaired, some of the escaping liquor found its way down a staircase into a disused retort house, and, through a grid and a drainage channel, into the river.

Cross-examining one of the workmen who mended the leak, Mr. Winning suggested that it would have been an easy matter to have stopped the drainage channel, and prevented any of the escaping liquor from entering the river. The reply was: "It might have taken a long time to stop it."

In a further letter to the *Daily Telegraph and Morning Post,* Dr. H. Levinstein stated he wished to remove the impression, made in a recent letter to that paper and referred to in last week's "Notes and Comments," that the recommendations of the Falmouth Committee will, if they are implemented by Parliament, effect a further rise of 4d. in the cost of benzene.

Synthetic Resin Moulding Materials

New British Standard Specification

THE British Standards Institution has just published a specification for Synthetic Resin (Phenolic) Moulding Materials and Mouldings (No. 771), the first of a series of British Standards for synthetic moulding materials and mouldings. This specification has been prepared as the result of requests received from the British Plastics Federation and other bodies. Hitherto, Specification No. 488, Moulded Insulating Materials suitable for Accessories for General Electrical Installations, was the only one which dealt in any way with synthetic resin mouldings; issued in 1933 it gives the minimum properties which any moulded article must possess when used for the specific purpose of moulding electrical accessories.

The new specification (price 2s., or 2s. 2d. post free) is intended to serve an entirely different purpose. It specifies the actual properties of one particular type of moulding powder and moulding—the phenol-formaldehyde or phenolic type. Several types of commercial phenolic moulding materials have been selected which are in general use for the manufacture of moulded articles or component parts and these have been classified according to their properties into five types; G (general type); GX (improved general type); MS (medium shock-resistant type); HS (high shock-resistant type); HR (heat-resisting type). Mouldings and the moulding materials from which they are made are classified under the same type designations.

Information from Test Specimens

The properties of each type have been determined by tests made on test specimens prepared under standard conditions, as it is usually impracticable to cut standard test pieces from finished mouldings. A valuable feature of the specification is in the details of the standard conditions for preparing the test specimens which are given in the appendices. A table is given to show the properties of each of the five types of material. A purchaser of either phenolic moulding material or phenolic mouldings can thus quote B.S.S. No. 771 and the type letter mark as the standard required or he can, if he so desires, build up a specification for a type of phenolic moulding or phenolic moulding material not classified, by selecting standard tests given in the specification and fixing a standard of performance.

The present specification does not give an exhaustive list of all the properties of phenolic mouldings and moulding materials which could be tabulated. A careful selection has been made, so as to reduce as far as possible the time and expense of testing any particular material, and the specification gives only those properties and methods of test which are of greatest importance. The figures which are given include mechanical and electrical properties, water absorption and plastic yield. Three standard methods of test are provided by which the purchaser of moulding powder can determine the powder density and bulk factor of a moulding material, the flow of moulding material in the mould by the cup flow test and the shrinkage of a moulded test specimen.

The present specification also gives methods of test which apply to moulded articles in order that the quality of the work of the moulder may be specified. These tests are necessarily incomplete because, as is stated above, it is usually impracticable to cut standard test pieces from finished mouldings and a new technique will have to be worked out before such a course is practical. This the British Standards Institution has under consideration. According to B.S.S. No. 771 a satisfactory degree of cure is ensured by determining the density and the acetone extraction: an undercured moulding will give a high acetone extract; a fully stoved moulding made with insufficient pressure will give a low density figure although the acetone extract may be satisfactory.

Manganese Ore Production in South Africa

A Record Year for the Dominion

ALTHOUGH the recent decline in the demand for manganese ore has reduced the South African manganese output from 69,826 tons in November to 52,021 tons in December the Dominion's total production of manganese ore amounted to 695,778 tons in 1937. This is by far the highest level ever reached, and compares with 281,866 tons in the preceding year.

Manganese ore was found in the Postmasburg district (Griqualand-West) some 20 years ago, but it was not until the end of last decade that production was developed on a fairly large scale by the Manganese Corporation (1929), Ltd., a company controlled by Huelva Copper and Sulphur Mines. The slump interfered seriously with the activities of this company, but a decisive change in the South African manganese industry took place towards the end of 1935, when the newly-formed Associated Manganese Mines of South Africa, Ltd., took over the leases and plant of the above-named company and several smaller groups holding manganese concessions in the Postmasburg and Kuruman districts. Associated Manganese Mines is financially backed by the Anglo-Transvaal Consolidated Investment Co., so that a sound development was secured from the very beginning. The results are indicated by the South African production figures for 1936 and particularly 1937.

South African manganese ore has found a ready market in practically all major steel countries in the last two years. Germany is using very large quantities of the South African product. In 1937 the German steel industry imported no less than 229,634 metric tons of South African manganese, against 108,602 tons only in the preceding year. The young South African industry has thus ousted Russia and British India from the position of Germany's leading manganese ore suppliers.

The outlook for the South African manganese production in 1938 remains good. With an output of nearly 700,000 tons, the Dominion was the third largest manganese producing country in the world behind Russia and India last year.

New Soft Lead Glazes

Possibilities Investigated

THE possibilities of some new soft lead glazes of low expansion have been explored by Geller, Bunting and Cremer (*Bureau of Standards, Jour. Research,* 1938, *20*, 57-66).

The $PbO-SiO_2-B_2O_3$ system was studied in some detail, the glazes prepared being examined for solubility (in 20 per cent. acetic acid), the ease of maturing, and coefficient of expansion. All compositions required the addition of 5 per cent. of Al_2O_3 to prevent devitrification. This addition decreased in some cases the solubility of the PbO in the glaze, and in other cases increased it.

In terms of empirical formulæ the most suitable compositions, combining a fairly low solubility with low maturing temperature, were those contained in the ranges PbO = 1.0, Al_2O_3 0.28–0.43, B_2O_3 1.17–3.02, SiO_2 3.72–7.11. Glazes with more than 55 per cent. SiO_2 or less than 25 per cent. PbO and 15 per cent. B_2O_3 were too viscous to mature below 1,150° C., whilst those with less than 40 per cent. SiO_2 or more than 40 per cent. PbO and 30 per cent. B_2O_3, were too soluble with respect to the lead.

In the chosen range, the glazes could be matured below 1,025-1,125° C., and some were of very low solubility, but others were probably too soluble to be used on containers for food. The thermal expansion of all of them was considerably lower than that of typical commercial "semi-porcelain" glazes, being $3.7-4.4\ 10^{-6}$ for the former as against $5.5-5.8\ 10^{-6}$ for the latter.

Starting Young Workers Safely in Industry

By

W. J. RANDALL, of Boots Pure Drug Co., Ltd.

THAT the proportion of reportable accidents among juvenile workers is far greater than those occurring among adults, comes as a disconcerting fact to all those who are concerned with safety in industry. In a foreword to a new pamphlet, "Starting Young Workers Safely in Industry" (pp. 48), prepared and published by The National Safety First Association Incorporated, price 9d., H.M. Chief Inspector of Factories lays great stress on the fact that this regrettable state of affairs may be largely ameliorated by the adoption of appropriate safety schemes and lays the primary responsibility for the present situation at the doors of the employer and management. This first edition is the outcome of an attempt to combine and summarise the information collected up to the present by the N.S.F.A. through its members, principally for the benefit of those smaller organisations who, employing few juveniles or for other cogent reasons, have no works school or apprentice training scheme of their own.

The pamphlet under review is divided into two parts, the first of which deals in some detail with the problem and its treatment, while the second is confined to the citation of a few examples of schemes already at work, together with references to the literature.

Part I is divided into seven sections, of which the first is devoted to the setting out of the problem under review, together with some relevant statistics. In the second section, the history of the study of this problem is briefly dealt with and also the part played by various individuals in the development of this study. The third section, which deals with the selection and placing of the juvenile in industry, occupies only one page and, in consequence, throws very little light on what may be considered to be a fundamental problem from the employer's point of view. Rather more space is devoted in the fourth section to the consideration of the first weeks of employment of the young worker. Here are stressed the value of works tours to the juvenile (bearing in mind the importance of selecting a guide with the right personality), the use of safety lectures in conjunction with the tours, the differences of opinion in connection with the use of books of rules, the right use of supervision and how far limitation of work may be desirable. The human aspect of the problem is by no means neglected as there is mention of the need for proper selection and training of those entrusted with the burden of supervision, it being pointed out that the old worker is not necessarily the best instructor for the novice.

The fifth section emphasises the necessity for safety training after the first week or two. This, it is considered, may well be accompanied by a series of refresher talks on safety given weekly for the first few months by a suitable and responsible person. This person may be co-opted from outside the works to lecture on special points. For instance, any abnormal occurrence of cases of sepsis might best be dealt with by a lecture from a medical officer connected with a local hospital. Where few juveniles are employed, replacement of the lecture by the personal interview is recommended. The assistance of the existing safety committee in juvenile training occupies a small portion of this section and the formation of a juvenile subcommittee is cited as having beneficial results. Consideration is given to special aspects of the problem in the sixth section. The limitation of the use of financial incentives to safe working is discussed with suggestions as to the extent to which it is desirable that these should be made use of. The desirability of prompt first aid treatment for any injury, however slight, and the means to be adopted to ensure this are set out at some length. The suggestion is also made that the use of the cinema film should be attempted as an easily understood yet interesting form of instruction that is also readily remembered. The section concludes with a short description of a suggested statistical method of investigating the comparative accident rates of adults and juveniles. There is a short section at the end of Part I which is a brief summary of the preceding discussion.

Part II consists chiefly of summaries of the schemes adopted by a number of firms in different trades for the training of their juveniles. These schemes differ, as may be expected, in their approach to the problem, varying from a full scheme of apprentice training to that of a more modest but possibly equally efficient personal supervision. A study of these schemes as set out here will assist anyone to adopt or prepare a scheme most suited to his own conditions. It concludes with a list of references to relevant literature numbering eleven in all.

There is little or no mention of the chemical industry and its special hazards, although it would be unreasonable to expect this in a pamphlet devoted to general principles, and the writer feels that in this connection the importance of adequate and readily available technical education and instruction, coupled with the inculcation of personal discipline, cannot be over stressed in any safety scheme connected with a chemical works. Whilst also the value of safety training cannot be over-estimated, experience in industry suggests that no amount of training will make wholly responsible those whose psychological make-up renders them intractable, careless, irresponsible or accident prone, and this constitutes a human problem which can hardly be laid at the door of industry alone. From an industrial point of view a careful weeding out of juvenile workers offers the only answer to this problem.

The pamphlet will stimulate thought in many directions and it can be recommended to all employers of juvenile labour, as well as to executive officers and foremen directly responsible for the supervision and safety of juveniles.

Delignification of Wood

Action of Strong Alkali Solutions

THE delignification of wood by solutions of strong alkalies has been studied by Lusby and Maass in the December (1937) issue of the *Canadian Journal of Research*. A laboratory scale equipment was used in which 10 gms. of wood chips were heated in a metal digester of 80 cc. capacity, in a continuous flow of the solution whose effect it was desired to observe. Solutions of sodium, lithium and potassium hydroxides were used at concentrations ranging from 1.4 to 14.3 molar, and at temperatures of 120°-180° C.

It was established that in all cases the rate of delignification increases with the concentration, being, in sodium hydroxide at 160°, about twice as fast in 2.9m solution as in 1.4m; at higher concentrations the rate is somewhat less than that expected from direct proportionality. Lithium hydroxide effected delignification at a much slower rate than sodium hydroxide, whereas potassium hydroxide was very much more rapid than the latter, especially in the higher concentration region. It is thus established also that the rate is proportional to the size of the alkali cation. It was found that the rate of attack is apparently diminished if accumulation of the products of the delignification reaction is allowed to occur, as is done in practice.

THE Kabelfabriek A.G., of Budapest, has commenced the manufacture of plastics for gramophone records.

Institute of Chemistry

Annual General Meeting : Presentation of Medals—Work of the Council—Future Policy

BEFORE the transaction of the business of the sixtieth annual general meeting of the Institute of Chemistry held in the hall of the Institute in Russell Square on Tuesday evening, Sir Robert Pickard, President, presented the Meldola Medal and the Sir Edward Franklin Medal and prize. The Meldola Medal, presented each year to the chemist of under thirty years of age whose work was considered the most meritorious of that brought to the attention of the council, was awarded to Mr. R. P. Bell, M.A., Ph.D., of Balliol College, Oxford. The President said that Dr. Bell had published a very large number of original papers which could be classified broadly under three subject heads :—1. The nature of solutions; 2. The mechanism of chemical reaction in solution; 3. The application of quantum mechanics to chemical kinetics. In replying, Dr. Bell made acknowledgment to the help which he had received in his work from Sir Harold Hartley, his tutor, Professor Brönsted, of Copenhagen University, for starting the lines of thought upon which he worked, and Professor Hinshelwood, in whose laboratory he had worked for the past five years. The Sir Edward Franklin medal and prize, awarded each year for the best essay by a student on a chemical subject, was presented to Mr. Lewis Smith, of the Sir John Cass Technical Institute, for an essay on " The Study of Chemistry."

In moving the adoption of the annual accounts, which were this year presented in a new form, Mr. Bernard F. Howard pointed out that the income from subscriptions showed an increase of some £700 over the previous year. The excess of income over expenditure during 1937 was about £625, which, on deducting the deficit of 1936, still showed an excess of £245. The number of contributors to the benevolent fund account during last year was 614 in excess over 1936, largely in response to a special appeal.

The President, in moving the adoption of the report of the Council, announced that the roll of Fellows and Associates now exceeded 7,000. In referring to losses by death during the past twelve months, he recalled the names of Mr. W. Bates Ferguson, K.C., Sir David Orme Masson, Professor A. G. Perkin, Dr. J. A. Voelcker, and Professor Sydney Young.

Employment of Newly Qualified Associates

The President reviewed the work of the Council, showing that the Institute participated in many matters of public interest, and remarked that, notwithstanding the increasing membership, the newly qualified associates were becoming steadily absorbed in industry and in other branches of practice, so that less than one per cent. were known to be without appointment at the present time. In this connection, however, he mentioned the difficulty sometimes expressed by the heads of large industrial and research organisations in hearing of men suitable for appointment to positions of responsibility, other than by promotion from existing staffs. He proposed to ask the Council to consider the possibility of concentrating on the problem of placing highly qualified men who, though perhaps past middle age, were still fit for senior positions. He hoped that the heads of large organisations and directors of industrial concerns would avail themselves of the facilities afforded by the Institute's appointments register to an even greater extent than they had done in the past.

The President then submitted some considerations affecting the policy of the Institute. The Institute would continue to organise and register chemists who are competent within the meaning of the Charter and By-Laws, and do all that is possible to advance the prestige and interests of the profession. It would render such assistance as it could to the State, industry and commerce, by encouraging to the full the right employment of the chemical talent of the country and the utilisation of scientific knowledge in public affairs. It would also be ready to co-operate with other bodies in furthering the interests of science; it was, in fact, through its representation on the Chemical Council, actively working in close co-operation with the Chemical Society and the Society of Chemical Industry, in an endeavour to solve the problem of meeting the growing expense of the library of the Chemical Society and of chemical publications.

New knowledge is very largely gained by research workers subsidised by funds from the Department of Scientific and Industrial Research, the Royal Society and the Universities, but grants are rarely made to meet the expense of paper and printing, and the cost of publication, therefore, falls almost entirely upon members of the profession. On this subject, the Chemical Council would have something to say in due course. That council had made an appeal for funds, and had so far succeeded in raising for chemistry a sum of nearly £52,000, but much more would be needed to place the affairs of the publishing chemical societies on a satisfactory basis.

The result of the ballot for the election of Officers and Council for the ensuing year was announced, Sir Robert Pickard being re-elected president.

Ten Years Back

From " The Chemical Age," March 3, 1928

Charged with agitating and organising a hostile demonstration against Sir Alfred Mond at Baghdad, Yussuf Effendi, formerly a teacher, has been taken to Basrah for trial.

* * * *

The Diamond Fertiliser and Chemical Co., Ltd., of York, announce that they have opened out a department dealing with the sale of Belgian cement, and that their trade will be done with wholesale merchants only for shipment in cargo loads all round the coast.

* * * *

It is announced that a contract has been signed between the Second Lincolnshire Beet Sugar Co. and Sir Robert McAlpine and Sons, for the construction of a beet sugar factory at Brigg, Lincolnshire, at a cost of £300,000. The new factory, which will have a minimum capacity of 700 tons per day, will be constructed from the designs of an American company, and will be ready for handling the 1928 beet crop.

John Benn Hostel Warden Married

ONE hundred happy boys from the John Benn Hostel towed the bridal car through the streets of Stepney on Thursday, when Mr. Aubrey Townshend, warden of the hostel, was married to Miss Waller, its appeal secretary.

After the wedding at the Parish Church, a reception was held at the hostel in Bower Street.

Sir Ernest Benn, the founder, in proposing the health of the bride and bridegroom, said that of all the successes achieved at the hostel during the ten years of its existence, none was more happy, or augured so well for the future, than this wedding which united Mr. and Mrs. Townshend even more closely with the splendid work they were doing.

Sir Ernest added, amid loud laughter from the boys, that if there was any slacking in the discipline which the warden had hitherto imposed he would have something to say about it!

As their wedding present the boys, old boys, and friends of the Association (which also comprises King George's House, Stockwell) subscribed for a trailer caravan in which Mr. and Mrs. Townshend will spend part of the summer camping with the boys at Tonbridge.

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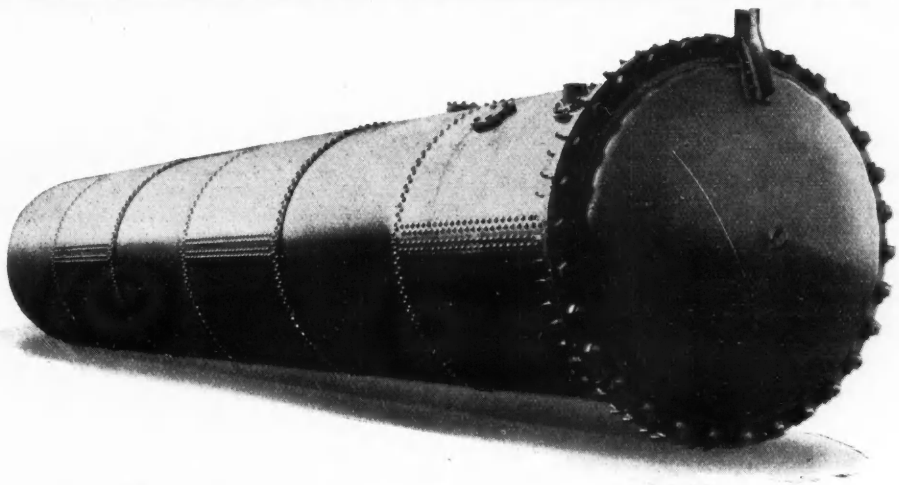

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Benzine synthesis from carbon monoxide and hydrogen. Tsuneoka and Nishio, *J. Soc. Chem. Ind. Japan, 14,* 11-22B.

Carbonisation of bituminous coals. Warren, *Ind. Eng. Chem., 30,* 136-141.

Distillation and adsorption and the sulphur in oils. Free, *Chem. Ztg., 62,* 108-110.

Benzine from coal. Neuwirth, *Osterreichische Chem. Ztg., 41,* 75-82.

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Nitrocellulose solvents. Doolittle, *Ind. Eng. Chem., 30,* 189-203.

Purification of cellulose and its control. Steinschneider, Schepp and Wultsch, *Papier Fabrik. (techn. Teil), 36,* 36-40.

Nitrocellulose from wood pulp. Seiberlich, *Pulp and Paper, 30,* 17-19.

Bleaching, Dyeing, Finishing

Naphthol AS in acetate rayon dyeing. Metzger and Röhling, *Melliand Textilber (English ed.), 19,* 34-36.

Crease-resistance of artificial silk. Elöd and Etzkorn, *Angew. Chem., 51,* 45-52.

Bleaching of cellulose fibres. Justin-Mueller, *Teintex, 3,* 85-88.

Alginates in finishing. Colomb, *Teintex, 3,* 94-101.

Alkali-soluble cellulose ether finishes. Cohol, *Teint. Imp. Blanch. App., 15,* 621-633.

Analytical control in the bowking and bleaching of cotton. *Teint. Imp. Blanch. App., 15,* 679-681.

Glass, Ceramics

Oxidation and reduction equilibria in coloured glasses. Kühl, Rudow and Weyl, *Sprechsaal, 71,* 91-93.

Clouding of glass in atmospheres containing sulphur dioxide. Coward, *Glass Rev., 14,* 24-28.

Reaction velocities in glass mixes. Zschacke, *Glastechn. Ber., 16,* 13-19.

Metals, Electrometallurgy

Nitrogen hardening of steels. Jones, *Metal Treatment, 3,* 165-170.

Nickel-molybdenum steels. Chubb, *Metal Treatment, 3,* 173-176.

Electrochemical corrosion of metals. Müller, *Chim. et Ind., 39,* 31-39.

Pickling of irons and steels. Herzog, *Rev. Chim. Ind. Quesneville, 46,* 360-365.

Fats, Oils, Waxes

Constants of wood oil. Frahm and Koolhaas, *Rec. Trav. Chim. Pays-Bas, 57,* 79-89.

Stand oil from sunflower oil. Stocks, *Farben Ztg., 43,* 134.

Combined carbon dioxide in soaps and detergents. Hitchcock and Divine, *Oil and Soap, 15,* 8-10.

Separation of highly unsaturated acids of fish oils. Farmer and Van den Heuvel, *J. Soc. Chem. Ind., 57,* 24-31.

Oiticica and tung oils. Sorenson, Schumann and Mattiello, *Ind. Eng. Chem., 30,* 211-215.

Paints, Pigments, Resins

Synthetic resin printing inks. Hall, *Oil Col. Trades J., 93,* 579-581.

Aspects of chemical colours. Grove, *Drugs Oils Paints, 53,* 11-20.

Oil-soluble resins for paints and varnishes. Redfarn, *Fed. Paint Varnish Prod. Clubs Dig.,* No. 172, 5-13.

Evaporation data for solvents in lacquer films. Bogin and Wampner, *Paint Varnish Prod. Manager, 18,* 64-71.

Rubber, Plastics

Measurement of swelling. Gleizes, *Rev. Générale Caoutchouc, 14,* No. 137, 3-8.

Testing of artificial resins. Weigl, *Kunststoffe, 28,* 5-8.

Phenolic resins. Hönel, *Oil Col. Trades J., 93,* 593-594, 597.

Influences of copper on rubber. Okita, *J. Soc. Chem. Ind. Japan, 41,* 23-26B.

Composition of Hevea latex. Kemp, *Ind. Eng. Chem., 30,* 154-158.

Vulcanisation of rubber in the presence of meta-dinitrobenzene. Wright and Davies, *Inst. Rubber Ind. Trans., 13,* 230-250.

Miscellaneous

Polymerisation catalysts. Vogel, *Chem. Ztg., 26,* 51-52.

Wetting and penetrating agents. Brédeau, *Rev. Prod. Chim., 40,* 741-744.

Preservation of wood: metallic naphthenates. Courtney Bryson, *Paint Varnish Prod. Manager, 18,* 28-31.

Combustion of solids and gases. Kovache, *Arts et Métiers, 91,* 241-246.

Wetting and dispersion. Bowles, *Oil Colour Trades J., 93,* 211-213.

Extraction by immiscible liquids. Wollner and Matchett, *Ind. Eng. Chem. analyt. ed., 10,* 31-32.

Liquid chloronaphthalenes for the protection of wood. Walter, *Farbe u. Lack,* 1938, 19-20.

Personal Notes

THE LATE MR. WILLIAM HENRI MURRAY-SALAMON, of Worthing, and formerly of St. John's Wood, N.W., chemical manufacturer, who died on January 13, left estate in Great Britain valued at £39,627, with net personalty £39,463 .

MR. W. W. ATLEY, has been appointed engineer and general manager of the chemical works of Athole G. Allen (Stockton), Ltd. Mr. Atley is a native of Hartlepool and came to Stockton as manager of the gas works in January, 1920.

SIR FRANK SMITH, K.C.B., C.B.E., F.R.S., secretary of the Department of Scientific and Industrial Research, and secretary of the Royal Society, has been elected honorary member of the Institution of Civil Engineers. He is James Forrest lecturer for 1938 and will deliver a lecture on "Disorderly Molecules, Refrigeration and Engineering" before the Institution on May 3.

MR. M. V. E. LEVEAUX (chairman) and MR. H. CLAYTON have resigned from the board of George Adlam and Sons, who own L. Lumley and Co., and make chemical and brewing plant, bottling and refrigerating machinery, and also plant for the manufacture of artificial silk. MR. S. H. GILLETT, chairman of Thomas Wallis and Co., Ltd., and other companies, has been elected chairman in the place of Mr. Leveaux, and MR. T. R. DIXON has been elected a director.

DR. HENRY DREYFUS, chairman and managing director of British Celanese, Ltd., and Miss Elizabeth Deborah Jenkinson, of Bear's House, Wentworth, Surrey, were married at the Caxton Hall, Westminster, Register Office on Thursday. Dr. Dreyfus, who is 56, is of Swiss origin, and was granted British nationality last year. He came to live in England during the war. Miss Jenkinson, who is 29, is the only daughter of the late Captain John Banks Jenkinson, the Rifle Brigade, and Mrs. Algernon Langhorne.

PROFESSOR W. L. BRAGG, D.Sc., F.R.S., director of the National Physical Laboratory, has been elected to succeed the late Lord Rutherford, as Cavendish professor of experimental physics at the University of Cambridge. He is the son of Sir William Bragg, and was born at Adelaide, Western Australia, in 1890. Prior to his appointment at the National Physical Laboratory last year, Professor Bragg was Langworthy professor of physics at Manchester University. He was awarded the Nobel prize for physics in 1915, for work carried out in collaboration with his father; in 1931 he received the Hughes Medal of the Royal Society. The stipend of the Cavendish professor has recently been raised to £1,400 per year.

DR. ROBERT R. WILLIAMS, of New York, chemical director of the Bell Telephone Laboratories, has been awarded the Willard Gibbs medal of the Chicago section of the American Chemical Society, for "outstanding work in connection with the study and isolation of the beri-beri vitamin." Dr. Williams announced the discovery of the chemical structure of vitamin B_1, the antineuritic vitamin now called thiamin, in January, 1935. He began experiments in the endeavour to isolate the vitamin, in the Philippines, in 1910. Patents concerned with the process of manufacture of synthetic vitamin B_1 have been assigned to the Research Corporation, New York. Under licence from this corporation, the vitamin is being produced commercially on a substantial scale and is being distributed by prominent drug firms. Dr. Williams was born in Nellor, India, in 1886. He was educated at Ottawa University in Ottawa, Kan., and at the University of Chicago. He began his career as a teacher in the Philippines in 1908. From 1909 to 1915 he was chief chemist of the Philippine Bureau of Science. After three years with the United States Bureau of Chemistry in Washington, D.C., he became associated with the Melco Chemical Co., of Bayonne, N.J., in 1919, and later joined the staff of the Western Electric Co.

DR. J. M. NAFTALIN, of Ayr, has been appointed lecturer in biochemistry at the Technical College, Bradford.

THE LATE SIR JOHN FERGUSON BELL, of Mickleover, chairman of the Derby Gas Light and Coke Co., has left estate valued £61,511, with net personalty £59,874.

MR. J. D. MOUNTFIELD, M.Sc. (Tech.), Ph.D., A.I.C., has been appointed assistant lecturer in applied chemistry in the Faculty of Technology, Manchester University.

MR. F. W. GAMBLE, Ph.C., will deliver the Harrison memorial lecture at a meeting of the Pharmaceutical Society of Great Britain on March 8. The title of the lecture will be "Facing Realities." Mr. Gamble was awarded the Harrison lectureship medal in 1937 and this occasion is being taken to present the medal to him. The Harrison lectureship medal is awarded biennially to commemorate Colonel E. F. Harrison, a distinguished pharmaceutical chemist who was director of chemical warfare in 1918.

OBITUARY

MR. THOMAS G. WATTS, Flandaff, Cardiff, who was director of research for the Powell Duffryn Associated Collieries, Ltd., and was one of the best-known industrial consulting chemists and analysts in South Wales, has died at the age of 52.

MR. FREDERICK JANSON HANBURY, who for more than 20 years, until his recent retirement, was chairman of Allen and Hanburys, Ltd., has died at East Grinstead, at the age of 86. Son of the late Mr. Cornelius Hanbury, of Little Berkhampstead, Herts, he succeeded his father in 1916 as chairman of the firm.

MR. FRANK BAINBRIDGE, works manager of the Skinningrove Iron and Steel Co., Ltd., died suddenly at his home at Carlin How, on February 26, aged 46. The son of Mr. George Bainbridge, who was town clerk of Middlesbrough, 1876-1902, he was a chemist and metallurgist of distinction. He received his early training under the late Dr. J. E. Stead, and joined the Skinningrove Iron and Steel Co. as a chemist twenty-five years ago, ultimately becoming works manager about a year ago. The services which Mr. Bainbridge gave to chemistry and metallurgy were recognised by the award of the Carnegie gold medal. The Iron and Steel Institute awarded him the Williams' Prize for a paper on research in fuel economy, in which he pursued the possibilities of utilising waste heat from blast furnaces and coke ovens. Three years ago Mr. Bainbridge was elected president of the Cleveland Institution of Engineers. Prior to his death he had not been in the best of health, but was at work in his office on the previous evening.

Foreign Chemical Notes

Switzerland

TRIAL BORINGS FOR OIL ARE TO BE MADE in the Canton of Waadt, by a company backed by Dutch and Belgian capital.

Finland

A NEW COLOUR-PRODUCING COMPANY, the Hangon Väri O.Y., of Hangö, has been formed with an initial capital of 200,000 Finnish marks.

Jugoslavia

A FACTORY FOR SUNFLOWER OIL EXTRACTION is being built by the "Biljana" concern at Debeljaca. Simultaneously, large areas are being planted with sunflowers to provide the necessary raw material.

THE EXPORT TRADE IN INSECTICIDES to the United States is being held up because of discrepancies revealed in analyses by the Jugoslavian and American authorities. The tests applied to medicinal plants on the American side are apparently more rigid than in Jugoslavia.

From Week to Week

A NEW SMELTING FURNACE, capable of producing 40,000 tons of basic steel per annum, is being put into operation at the Hallside Steelworks, Newton, Cambuslang, this week. The furnace is of Austrian construction.

ENGINEERS WHO MAY WISH TO COMMUNICATE information or opinions for the consideration of the Committee on the Status of the Engineer should communicate with the Hon. Secretary, Mr. E. W. Yates, 62 Parkview Court, Hurlingham, S.W.6.

BROWN AND FORTH, LTD., have issued a new booklet, in connection with Hydranol resins which are copal gum esters, in which the copal is combined with rosin after a special process so that the copal molecule and its reactive strength are retained as far as possible.

FOLLOWING REPORTS THAT A VAST DEPOSIT OF OIL had been found in Kuwait, Arabia, an official of the Kuwait Oil Co., has announced that the company was drilling its second well. The Kuwait Oil Co. was formed in 1934. Its shares are held equally by the Anglo-Iranian Oil Co. and the Gulf Exploration Co.

GYPROC PRODUCTS, LTD., which is a subsidiary of the Distillers' Co., Ltd., opened a new factory at Shieldhall, Glasgow, on February 18. The manufacture of gypsum products, which includes plaster-board and other building materials brings a new industry to Clydeside. The gypsum rock is imported from Nova Scotia in 6,000-ton cargoes.

AN AGREEMENT HAS BEEN REACHED between the National Council of Associated Ironmasters and the National Union of Blast Furnacemen, whereby blast furnacemen in England and Wales will be entitled to seven consecutive working days' holiday annually with pay. The scheme will come into operation at the beginning of April this year, and about 17,000 men will benefit.

AN ENTIRELY NEW STYLE OF DISTANT READING THERMOMETERS with chromium-plated cases has been introduced by Coley Thermometers, Ltd. These new models also have armoured cable and copper bulb, heavily nickelled new easy-reading dials, and a new angle bulb for fixing in confined spaces. Coley Thermometers, Ltd., are now an approved firm under the Aeronautical Inspection Directorate.

GLAXO LABORATORIES, LTD., of Greenford, Middlesex, have increased their nominal capital by the addition of £350,000 in £1 ordinary shares beyond the registered capital of £400,000. At January 6, 1938, Joseph Nathan and Co., Ltd., held 399,500 shares out of 400,000 issued. Part of the above increase is for the purpose of acquiring the issued share capital of Joseph Nathan and Co. (Australia) Proprietary, Ltd.

FEARS ARE EXPRESSED in Mexico City that the large British and American combines will be seriously affected by sales of oil by the Mexican Government to independent firms. Foreign agents have been busy recently arranging exports of oil. It is reported that Centralamer, Ltd., has been negotiating with the Government to buy £3,000,000 worth of oil for re-sale to foreign Governments.

THE GENERAL EAST END TRADESMEN'S ASSOCIATION, of which Mr. W. Lloyd Willey is president, recently held their banquet at The Abercorn Rooms in aid of the London Hospital. Sir Thomas Miller Jones was in the chair, and the handsome sum of £700 was raised. After the banquet there was dancing until 1 a.m., and, apart from its charitable object, the event was a most enjoyable one for all who attended. Among those present was Mr. C. B. Woodley, secretary of the British Association of Chemists.

IN AGREEMENT WITH THE GOVERNMENT, Colvilles, Ltd., has undertaken to re-open a portion of Mossend Steel Works, Lanarkshire. It is not proposed to undertake the manufacture of steel. Two of the existing buildings will be equipped for the treatment and machining of steel plates, which will be rolled at the company's works at Dalzell, Motherwell, and sent to Mossend to be completed. A considerable amount of alteration is required and it is not expected that the new work will be started for some months. A short time ago a site of about 25 acres at Mossend was sold to the Imperial Chemical Industries, Ltd., and a branch chemical factory is now being erected.

PORT SUNLIGHT, the pioneer industrial garden city, in Cheshire, created by the first Viscount Leverhulme, celebrated its golden jubilee on March 3. On the corresponding day in 1888, the first square of turf was turned with a silver spade by Mrs. William Hesketh, who afterwards was Lady Lever. The country where Port Sunlight stands alongside the Mersey, between Bebington and Bromborough, was at the time open fields and marshes. There were 56 acres of land, 24 intended for the soap factory and 32 for homes for the workpeople. To-day Port Sunlight comprises more than 500 acres, and the first factory has grown into four, with many auxiliary establishments and a huge private dock. The first of the public buildings, the village hall, was opened by Mr. Gladstone in 1891.

SPECIFICATION OF TIE RODS AND STANDARD HEXAGON COUPLINGS, as manufactured by Head, Wrightson and Co., Ltd., are given in a new leaflet.

ENO PROPRIETARIES, LTD., announces that Investment Managers and Secretaries, Ltd., 116 Old Broad Street, E.C.2, has been appointed registrars of the company, and that from February 28, the transfer office will be situated at that address.

STEEL IS BEING PRODUCED IN GERMANY this year at the rate of 1,800,000 tons a month, which is a record figure. In his Reichstag speech Herr Hitler declared that the year's output would reach 21,000,000 tons.

APPLICATION HAS BEEN MADE to the Import Duties Advisory Committee for the removal from the free list and the imposition of an additional import duty on pig iron, other than pig iron smelted wholly with charcoal, and vanadium titanium pig iron produced in an electric furnace.

THE BRITISH CHEMICAL PLANT MANUFACTURERS' ASSOCIATION have published a new 1938 edition of their Official Directory. This directory is issued free to inquirers interested in the purchase of chemical plant. Copies can be obtained from the Association at 166 Piccadilly, London, W.1.

FOLLOWING TWO YEARS OF NEGOTIATIONS, a European Zinc sheet cartel has been formed. The countries which have adhered are Great Britain, Belgium, Holland, Germany, Poland, Austria and Czechoslovakia; France has also been invited to join. Quotas have been fixed, and it has been agreed that rolling charges should be increased and standardised.

THE WORKS OF THE BRITISH OXYGEN CO. at Jarrow, which were recently destroyed by fire and explosion are to be rebuilt. The office was the only building which was not damaged. The works supply acetylene gas to shipyards and factories. Large new works are to be built by the company at Birtley, County Durham, but they are not expected to be ready for about eighteen months.

A CONFERENCE OF LOCAL GOVERNMENT AUTHORITIES in the Greater London area, to consider what co-operative action can be taken to reduce the atmospheric pollution in the metropolis, was held at the County Hall, Westminster, on February 25, when Lord Snell, chairman of the London County Council, presided. It is anticipated that the outcome of this conference will be the formation of a regional smoke abatement committee for London to co-ordinate the administration of the law and educational work in the Greater London area.

THE AREA OF 300,000 ACRES between Assouan, Upper Egypt, and the Red Sea, which has been reported in certain quarters to be "rich in iron ore," is the subject of reserved rights accorded by the Government to an Egyptian, Habib Nessin, who is at present extracting iron chrome and transporting it to Cairo for colour manufacture. A contract exists between Nessim and Wolff's, the well-known ironfounders, of Cologne, by which Wolff's provide machinery to a maximum value of £3,000,000 for working the area, Nessim undertaking to export the iron ore to Germany at 14s. a ton c.i.f. Alexandria.

THE SUNDERLAND GAS CO., have been held liable for an explosion at Sunderland on October 23, 1936, when a house was blown up. At Newcastle Assizes on February 25, Mr. Justice Hilbery awarded agreed damages of £160 to John Hanson, of Sendon Valley Road, Sunderland, who also claimed against the Wearmouth Coal Co. Judgment was given for the coal company, with costs, and the Judge ordered that the costs be paid by the gas company. It was allaged that a subsidence, because of colliery workings, caused a fracture of a gas pipe and a consequent leakage of gas. The Judge said that the gas company failed to foresee the consequences to their own works of the coal company's mining operations. They had a high responsibility in carrying dangerous gas under the street of the town. If steel pipes and flexible joints had been laid, he did not believe that the accident would have occurred.

IMPORTANT CHANGES IN THE EXECUTIVE CONTROL of Imperial Chemical Industries, Ltd., were announced officially on March 1, following a board meeting of the company. It is stated that the functions of sole managing director, which have hitherto been exercised by Lord McGowan, will now be exercised by a management board composed of executives and non-executive directors. The chairman of the company, Lord McGowan, will be chairman of the management board. Lord McGowan, who is 63, became chairman and managing director of the company on the death of Lord Melchett in 1930. In addition to Lord McGowan, the board of directors comprises: Mr. H. J. Mitchell, the president, Lord Ashfield, Sir Christopher Clayton, Mr. W. H. Coates, Lord Colwyn, Mr. J. G. Nicholson, Lt.-Col. G. P. Pollitt, Mr. J. Rogers, Mr. E. J. Solvay, Mr. B. E. Todhunter, Mr. J. H. Wadsworth, Lord Weir, Lord Melchett, Mr. H. Gaskell, Mr. H. O. Smith.

Company News

International Paint and Compositions Co., is again increasing its ordinary dividend. The final dividend for 1937 is 16 per cent., making 20 per cent., less tax, payable on March 31. This compares with 16 per cent. for 1936, 14 per cent. for 1935 and 10 per cent. for 1934. Profits last year, at £158,295, show an increase of £32,671 on the 1936 figure of £125,624.

Calico Printers' Association, Ltd., have deferred consideration of the payment of a dividend on the 5 per cent. preference stock until the full year's results have been ascertained. The company's year ends on June 30, and the report is submitted early in September. Dividends on the preference shares are in arrears from December 31, 1935, and the last payment on the ordinary shares was 5 per cent. on account of 1928-29.

Waxed-Papers, Ltd., announce a trading profit for 1937 of £38,396 (£28,682); less directors' fees, £1,400 (same); N.D.C., £1,425 (nil); income-tax, £1,318 (£1,554); scheme of arrangement expenses, £1,504 (nil), leaving net profit £32,748 (£25,728); to general reserve £2,000 (£1,000); to building reserve £1,000 (nil); final of 9 per cent., less tax, and bonus of 5 per cent., making 17 per cent. (10 per cent.); £16,248 (£10,948) forward.

Bradford Dyers' Association announce another loss. After charging £150,097 for depreciation the accounts for 1937 show a profit of £29,018, but debenture interest requires £58,150, and the result is therefore a net loss of £29,132. This compares with a net loss of £20,102 for 1936. In only one year since 1929—in 1933—has a net profit been earned, and that was the sum of £1,740. The preference dividend is now five years in arrear, and ordinary stockholders have not received anything since 4 1/6 per cent. for 1930.

Borax Consolidated, Ltd., announce that net profits are £486,232, or about £101,706 more than in the previous year. The carry-forward from last year is £236,160. The first and second debenture stock interest amounted to £112,500, the dividends on the preference shares to £41,000 and the sinking fund to £5,825. To buildings and plant depreciation reserve has been placed £70,000, an increase of £10,000 over last year owing to the larger amount now involved. The company will pay a dividend of 6 per cent. for the year on the preferred ordinary shares, absorbing £36,000, and a dividend of 1s. 6d. per share, or 7½ per cent., and 2½ per cent. bonus, making 2s. in all, on the deferred ordinary shares, which will take £130,000. It is proposed to place to income-tax reserve and National Defence Contribution the sum of £32,000 and £5,000 to the pensions and grants fund; in addition to allocate to a special reserve account the sum of £50,000, after which there will remain a balance of £237,068 to be carried forward to next year.

New Companies Registered

Anodising and Platings, Ltd.—336,599. Private company. Capital, £3,000 in £1 shares. To carry on the business of anodising and electro-plating, etc. Subscribers: John Craig, 54 Langham Road, Teddington, Middlesex; Sidney R. Sheppard.

Refined Grease Products, Ltd. 336,703.—Private company. Capital, £2,000 in 2,000 shares of £1 each. To carry on the business of manufacturers of and dealers in ointments, emollients, lotions, medicines, chemicals, acids, salts, gases, drugs, etc. Subscribers: John Crook, 4 Percy Street, Fartown, Huddersfield, Wm. Lodge.

British Biochemic Association Supplies, Ltd. 336,916.—Private company. Capital, £5,000 in 50,000 ordinary shares of 1s. and 2,500 10 per cent. non-cumulative preference shares of £1 each. To carry on the business of importers and exporters, merchants and shippers, wholesalers, retailers, manufacturers and distributors of and dealers in all kinds of biotic substances, biochemical preparations, physiologicals, bio-super foods, all kinds of acids, alkalis and solids, etc. Directors: Reginald P. Barner, George Street, Mablethorpe, Lincs.; Agnes Gilbert. Registered office: 80 Mortimer Street, W.1.

Treforest Chemical Company, Ltd. 336,996.—Private company. Capital £100 in 100 shares of £1 each. To carry on the business of manufacturing, wholesale and retail chemists and druggists, manufacturers, importers and exporters of, agents for and dealers in all kinds of drugs, chemicals, gases, medicines, etc. Subscribers, Cosmo R. Cran, 5 Devonshire Square, E.C.2.; Percy Reed.

W. B. A. (Derby), Ltd. 336,999.—Private company. Capital £1,000 in 1,000 shares of £1 each. To acquire the letters patent No. 476,694, for "Improvements in and relating to processes and apparatus for the Washing and Deodorising Treatment of Noxious Fumes," and to carry on the business of manufacturers of and dealers in apparatus for the same, and all machinery, lubricants, solutions, deodorising fluids, etc. Directors: Joseph W. Warren, "Four Throw," Kings Newton, Derby; John S. Bailey, John L. W. Andrew. Registered offices: Probate House, St. Mary's Gate, Derby.

Longworth, Entwistle, Ltd. 336,890.—Private company. Capital £500 in 100 10 per cent. cumulative preference and 400 ordinary shares of £1 each. To carry on business as manufacturers of and dealers in germicides, disinfectants, deodorisers, chemicals, gases, fertilisers, salts, acids, oils, colours, etc. Directors: Harry Entwistle, 82 Alexandra Road South, Manchester, 16; Jas. H. Longworth. Registered office: 1 Hodson's Square, Manchester.

Chemical and Allied Stocks and Shares

THE general trend in the industrial and other sections of the Stock Exchange has been to lower prices this week. The undertone is described as reasonably steady, but in the absence of improvement in the volume of business there has been a tendency for profit-taking sales to develop. Nevertheless, at the time of writing most of the more active securities have retained part of the gains made in the previous week. The tendency in the market is to anticipate that for the time being the chief influence on sentiment is likely to be the international situation, and the disposition is to await developments in this connection and also the provisions of the Budget.

Shares of chemical and kindred companies had a fairly steady appearance. Imperial Chemical ordinary, exceptionally, were subject to rather sharp fluctuations prior to the official statement in regard to internal adjustments. At one time the price touched 29s. 6d., but has since recovered to 30s. 9d., which, however, is a few pence below the figure ruling a week ago. Boots Pure Drug were a steady feature and at 45s. 9d. are 6d. higher on balance. The market is confident the cash distribution of the latter company will be maintained and remains hopeful that sooner or later there is likely to be a scrip bonus of some kind. Lever and Unilever at 38s. 3d. are little changed, hopes of a larger dividend having continued to maintain a fair amount of interest in the shares. It is realised that the dividend policy of a company of this kind must be influenced a good deal by views as to the international trade, but the market is basing anticipations of a larger payment on the statement made when the Lever-Unilever fusion was effected that the closer association was likely to make for larger dividends for ordinary shareholders.

Associated Portland Cement at 86s. have been well maintained, awaiting the dividend announcement. British Plaster Board at 28s. 6d. have lost most of the improvement shown a week ago. Triplex Glass at 44s. were quite well maintained on balance. British Match at 34s. 9d. were a relatively steady feature, but Swedish Match at 25s. have lost part of their recent rise. General Refractories fluctuated moderately, pending the dividend announcement, which is expected about the middle of the month, and are 14s. 6d. at the time of writing, compared with 14s. 9d. a week ago. Dunlop Rubber continued to benefit from hopes that the dividend may again be 9 per cent., and although best prices were not held, are 32s. 4½d., compared with 32s. a week ago.

Fison, Packard and Prentice were steady at 34s. 9d. aided by reports of larger demand for fertilisers and by current market views that, despite the larger capital there seem reasonable prospects of the dividend being at least kept at 9 per cent. Cooper, McDougall and Robertson at 32s. 6d. were unchanged and continued to be held firmly. In this case the current market view is that the forthcoming results are likely to show a dividend of 8½ per cent., the same as for the previous year. British Oxygen, market views in connection with which were mentioned last week, fluctuated rather sharply, but on balance show a rise from 72s. 6d. to 76s. 3d. at the time of writing. Murex were 85s., a gain of 2s. 6d.; in this case the market is talking of the raising of the distribution from 20 per cent. to 25 per cent.

International Paint have risen to 72s. 6d. on the excellent impression created by the full results, which confirm that the raising of the dividend from 16 per cent. to 20 per cent. does not represent any deviation from the conservative treatment of profits shown by the company for a long period of years. Pinchin Johnson at 35s. were steady on expectations that the dividend on the larger capital ranking will be retained at 20 per cent. William Blythe 3s. shares were 5s. 10½d. awaiting the forthcoming results.

Iron and steel shares have moved in favour of holders in many instances, although the gains are moderate in character. Colvilles, which remained under the influence of the raising of the dividend from 7 per cent. to 8 per cent., are 24s. compared with 23s. 6d. a week ago, while United Steel have moved up from 26s. 3d. to 27s. on the higher interim dividend of 3 per cent. The market is now hopeful the total dividend of the latter company may be raised to 9 per cent. "Shell," Anglo-Iranian and other leading oil shares failed to hold the better prices made last week.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

GLUE FILMS.—G. W. Johnson (I. G. Farbenindustrie.) 3399.

PREPARATION OF NITROCELLULOSE.—Kodak, Ltd. (United States, Feb. 4, '37.) 3480.

AVOIDING FORMATION OF ZINC STAINS ON LAUNDRY.—Kohle und Eisenforschung, Ges. (Aug. 5, '37.) 3764.

REMOVAL OF THIONATES FROM SOLUTION.—N. Levy, Imperial Chemical Industries, Ltd., and Bolidens Gruvaktiebolag. 3966.

PRODUCTION OF METALLIC MAGNESIUM.—Magnesium Elektron, Ltd. (Germany, April 5, '37.) 3955.

MAGNESIUM ALLOYS.—Magnesium Elektron, Ltd. (I. G. Farbenindustrie.) 4114.

PRODUCTION OF AMINO-SUBSTITUTED ARYLOXY-ALKANOL ARSENO COMPOUNDS.—Parke, Davis, and Co. (United States, Sept. 2, '37.) 3597.

TREATMENT OF WASTE WATER, ETC.—K. Petersen. (Denmark, Feb. 23, '37.) 4115.

TREATMENT OF ALUMINIUM, ETC.—Petrie and McNaught, Ltd., and H. Shaw. 3367.

SILICATE CEMENTS.—R. Plischke, and M. N. Du Mont. 4023.

PREPARATION OF ORGANIC SUBSTANCES.—B. Rosenfeld. (May 10, '37.) 4012.

PRODUCTION OF LIQUID FUEL.—T. H. Sanders. 3887.

ETHERIFICATION PRODUCTS OF OXYALKYLAMINES.—E. M. Schwarz, F. O. Zschimmer, G. E. Zschimmer, G. M. W. Schwarz, and F. R. Schwarz. (Germany, Feb. 3, '37.) 3459; (Germany, Feb. 3, '37.) 3460 and 3461; (Germany, April 7, '37.) 3462; (Germany, April 23, '37.) 3463.

VAPORISATION OF ALLOYS in high vacuum voltage.—Siemens and Halske, A.-G. (Germany, Feb. 6, '37.) 3804.

MANUFACTURE OF SULPHATE OF AMMONIA.—T. B. Smith, and Dorman, Long, and Co., Ltd. 3956.

MANUFACTURE OF AZO-DYESTUFFS, ETC.—Soc. of Chemical Industry in Basle. (Switzerland, Feb. 10, '37.) 4046; (Switzerland, Jan. 12.) 4047.

MANUFACTURE OF CONDENSATION PRODUCTS.—Soc. of Chemical Industry in Basle. (Switzerland, Feb. 10, '37.) 4048. (Switzerland, Jan. 18.) 4049.

RECOVERY OF VOLATILE LIQUIDS from gaseous vehicles.—W. W. Spooner. 4004.

LUBRICATING OILS, ETC.—Standard Oil Development Co. (United States, June 22, '37.) 4036.

PRODUCTION OF AGENTS containing magnesium oxide and calcium carbonate from magnesium-containing substances.—A. A. Thornton (Kohle-und Eisenforschung Ges.). 3404.

METALLIC SOAPS.—L. W. E. Townsend. 3738.

SEPARATING, ETC., MERCURY FROM ORES, ETC.—White, Hughes and Co., and B. W. Ramsay. 3906.

PREPARATION OF MERCAPTO ARYL THIAZOLES.—Wingfoot Corporation. (United States, May 5, '37.) 3525.

VULCANISATION OF RUBBER.—Wingfoot Corporation. (United States, May 8, '37.) 3526; (United States, May 15, '37.) 3527; (United States, May 28, '37.) 3529; (United States, June 19, '37.) 3531.

STABILISATION OF DITHIO CARBAMATES.—Wingfoot Corporation. (United States, June 3, '37.) 3530.

PROCESS FOR THE RECOVERY OF THE SULPHUROUS ACID produced in the sulphite cellulose cooking process.—Zellstoffabrik Waldhof. (Germany, March 9, '37.) 4107; (Germany, July 7, '37.) 4108.

DE-WAXING OF OILS.—Aktiebolaget Separator-Nobel. (Sweden, Feb. 18, '37.) 4844.

PREPARATION OF DERIVATIVES OF AMINO-BENZENE-SULPHAMIDES.—Chinoin Gyogyszer es Vegveszeti Termekek Gyara Reszvenytarsasag Dr. Keresztv and Dr. Wolf. (Hungary, Feb. 13, '37.) 4233; (Hungary, Jan. 22.) 4234.

WEED-KILLING COMPOSITIONS.—Chipman Chemical Co., Ltd. (United States, March 16, '37.) 4454.

LEAD ALLOYS.—Chloride Electrical Storage Co., Ltd. (Germany, Feb. 13, '37.) 4581.

MAGNESIUM ALLOYS.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. (France, Feb. 16, '37.) 4694.

MANUFACTURE OF ORGANIC ESTERS OF CELLULOSE.—Courtaulds, Ltd., and J. P. Stoneman. 4248.

MANUFACTURE OF PLASTIC MASSES.—Deutsche Celluloid-Fabrik, A.-G. (Germany, Feb. 18, '37.) 4346.

POLYMERISATION OF UNSATURATED ORGANIC COMPOUNDS.—Distillers Co., Ltd., and H. P. Staudinger. 4839.

MANUFACTURE OF ALIPHATIC COMPOUNDS.—H. Dreyfus. 4202.

MANUFACTURE OF DITHIOHYDANTOINS.—E. I. du Pont de Nemours and Co. (United States, Feb. 23, '37.) 4880.

TREATMENT OF ZINC, ETC.—W. V. Gilbert. 4878.

MANUFACTURE OF MATERIALS RESISTANT TO WATER, ETC.—W. W. Groves (I. G. Farbenindustrie.) 4189.

MANUFACTURE OF PANCREAS HORMONE PREPARATIONS.—W. W. Groves. 4546.

MANUFACTURE OF THIURONIUM SALTS.—W. W. Groves. 4190.

BLEACHING CELLULOSE FIBRES.—W. W. Groves. 4553.

MANUFACTURE OF POLYMERISATION PRODUCTS.—W. W. Groves. 4554.

MANUFACTURE OF BUTADIENE.—W. W. Groves. 4555.

MANUFACTURE OF α-DIALKYLAMINO-ACRYLIC ACID NITRILES.—W. W. Groves. 4556.

MANUFACTURE OF AZO DYESTUFFS.—W. W. Groves. 4688.

MANUFACTURE OF POLYMERIC COMPOUNDS.—W. W. Groves. 4689.

FLUORESCENT SCREENS.—S. T. Henderson. 4144.

CHROMIUM-NICKEL ALLOYS.—Heraeus-Vacuumschmelze, A.-G. (Germany, April 5, '37.) 4467.

SEPARATION OF PROPANE and propylene from gas mixtures.—I. G. Farbenindustrie. (Germany, Feb. 16, '37.) 4572; (Germany, Feb. 17, '37.) 4573.

ADHESIVES.—G. W. Johnson (I. G. Farbenindustrie.) 4386.

STABILISATION OF POLYISOBUTYLENE.—G. W. Johnson (I. G. Farbenindustrie.) (Sept. 28, '36.) 4591.

TREATMENT OF COAL.—Johnson-March Corporation. (United States, May 8, '37.) 4230.

METHOD, ETC., FOR GENERATING A REDUCING GASEOUS MIXTURE.—G. G. Johnston. (Australia, Feb. 19, '37.) 4177.

CONDENSING GASES, ETC.—T. D. Kelly. 4334.

MANUFACTURE OF LUBRICANTS.—F. W. Kirkbridge and Imperial Chemical Industries, Ltd. 4265.

PRODUCTION OF CELLULOSE.—H. A. Knopf. 4172.

PURIFICATION OF ESTERS.—Kodak, Ltd. (Eastman Kodak Co.). 4610.

MANUFACTURE OF CYANINE DYES, ETC.—Kodak, Ltd., and B. Beilenson. 4456.

TREATMENT OF MATERIAL WITH CELLULOSE COMPOSITIONS.—M. Lawrence. 4790.

EXTRACTION OF PROTEIN from ground nuts.—A. McLean, and Imperial Chemical Industries, Ltd. 4882.

MANUFACTURE OF ORGANIC ACIDS, ETC.—N. McLeish, J. W. C. Crawford, and Imperial Chemical Industries, Ltd. 4264.

APPARATUS FOR THE THERMAL PRODUCTION OF MAGNESIUM.—Magnesium Elektron, Ltd. (Germany, March 27, '37.) 4753.

PRODUCTION OF CONCENTRATED SULPHUR DIOXIDE.—Metallges, A.-G. (Germany, May 22, '37.) 4605.

MANUFACTURE OF THREADS, ETC., from polymerised ethylene.—J. R. Myles, L. L. Bache, and Imperial Chemical Industries, Ltd. 4416.

DESTRUCTIVE HYDROGENATION under pressure of coal.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). 4146.

PREPARATION OF HYDROGENATION CATALYSTS, ETC.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). 4628.

POLYMERISATION OF COMPOUNDS.—Rohm and Haas, A.-G. (Germany, March 16, '37.) 4246.

MANUFACTURE OF ISOMERIC DIHYDROFOLLICLE HORMONES.—Schering, A.-G. (Germany, Feb. 16, '37.) 4742.

MANUFACTURE OF SEAMLESS HOLLOW BODIES OF PLASTIC MASSES. R. Serenyi, and A. Nadai. (Switzerland, Feb. 12, '37.) 4421.

MANUFACTURE OF BERYLLIUM OXIDE.—Seri Holding Soc. Anon. (Italy, Feb. 12, '37.) 4413.

DYEING, ETC.—Soc. of Chemical Industry in Basle. (Switzerland, July 10, '37.) 4344; (Switzerland, Feb. 10.) 4345.

SOLVENT EXTRACTION OF HYDROCARBON OILS.—Standard Oil Development Co. (United States, Sept. 8, '37.) 4357.

MANUFACTURE OF CELLULOSE COMPOUND COMPOSITIONS.—Standard Oil Development Co. (United States, May 15, '37.) 4387.

MANUFACTURE OF HYDROCARBON POLYMERS.—Standard Oil Development Co. (United States, April 9, '37.) 4485.

DEWAXING HYDROCARBON OILS.—A. H. Stevens (Texaco Development Corporation.) 4211.

PREPARATION OF 2.4-DINITRO-6-CYCLOHEXYL PHENOL.—W. J. Tennant (Dow Chemical Co.). 4608.

EXPLOSIVES.—M. Tonegutti. (Italy, Feb. 16, '37.) 4683.

PURIFYING, ETC., GREASY WASTE WATERS.—A. de Vreese. (Belgium, Feb. 19, '37.) 4349.

MANUFACTURE OF TETRACHLORETHYLENE.—Wacker Ges für Elektrochemische Industrie, Ges., Dr. A. (Germany, Feb. 22, '37.) 4549.

RESIN COMPOSITIONS.—B. J. Wood, and Imperial Chemical Industries, Ltd. 4881.

MANUFACTURE OF COLOURING MATTERS.—M. Wyler, and Imperial Chemical Industries, Ltd. 4883.

PRODUCTION OF CAST IRON.—H. J. Young. 4611.

BURNING OF MAGNESIA.—Agrikulturchemie C. Kutscher and Co. (Germany, Feb. 20, '37.) 5376.

PRODUCTION OF SYNTHETIC RESINS.—Albert Products, Ltd. (Germany, March 8, '37.)

PRODUCTION OF MOTOR FUELS.—Anglo-Iranian Oil Co., Ltd., A. E. Dunstan and F. E. A. Thompson. 5607.

EXTRACTION OF ALKALI FROM MINERALS.—A. Brammall, and J. G. C. Leech. 5125.

MANUFACTURE OF COLOURLESS PHOSPHORIC ACID.—Chemische Fabrik Budenheim, A.-G. (Germany, Feb. 20, '37.) 5289.

TREATMENT OF RUBBER.—H. Barron. 5031.

PRODUCTION OF BUTANDIOL-1 :3.—Consortium für Elektrochemische Industrie Ges. (Germany, Feb. 24, '37.) 5484.

PRODUCTION OF BUTANOL-1-ONE-3.—Consortium für Elektrochemische Industrie Ges. (Germany, Feb. 24, '37.) 5485.

MANUFACTURE OF ORGANIC ACIDS.—J. W. C. Crawford, N. McLeish, and Imperial Chemical Industries, Ltd. 5209.

MANUFACTURE OF NITRILES.—F. H. S. Curd, and Imperial Chemical Industries, Ltd. 5794.

CATALYTIC HYDRATION, ETC., REACTIONS.—Distillers Co., Ltd., and H. M. Stanley. 5400.

PRODUCTION OF IRON FROM ORE.—F. L. Duffield. 5293.

MANUFACTURE OF CEMENTS.—J. S. Dunn, R. G. Franklin, V. Lefebure, and Imperial Chemical Industries, Ltd. 5505.

Specifications Open to Public Inspection

IRON DESULPHURISATION.—R. P. Heuer. Aug. 19, 1936. (Cognate Application, 11007/37. 11006/37.

PURIFICATION OF GAS.—R. Mezger and T. Payer. Aug. 21, 1936. 193959/37.

PROCESS OF CRACKING HYDROCARBON OILS.—Gulf Oil Corporation. Aug. 21, 1936. 21209/37.

PRODUCTION OF RESINOUS COMPOSITIONS.—Bakelite, Ltd. Aug. 18, 1936. 21792/37.

PURIFICATION OF WASTE LIQUORS.—E. Maier. Aug. 18, 1936. 21926/37.

METHOD OF PREPARING A CATALYST from copper and aluminium. Association of American Soap and Glycerine Producers, Inc. Aug. 17, 1936. 22576/37.

Specifications Accepted with Dates of Application

MANUFACTURE OF ISOCYCLIC COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) June 5, 1936. (Samples furnished.) 479,835.

MANUFACTURE OF PHOTOGRAPHIC SILVER HALIDE EMULSION LAYERS.—I. G. Farbenindustrie. July 16, 1935. 479,838.

HEAT-TREATMENT OF COPPER-CHROMIUM ALLOY STEELS.—W. P. Digby, and E. T. Digby. July 3, 1936. 479,521.

PREPARATION OF MAGNESIUM.—National Processes, Ltd., and S. Robson. Aug. 7, 1936. 479,842.

REFINING SPERM OIL.—W. Holwech. Aug. 8, 1936. 479,758.

MANUFACTURE OF CALCIUM CARBIDE.—A.-G. Fur Stickstoffdunger. Aug. 9, 1935. 479,763.

MANUFACTURE OF EXTRACTS from the anterior lobes of the hypophysis.—I. G. Farbenindustrie. Aug. 8, 1935. 479,764.

PRODUCTION OF NITROPHENOLS.—J. Schindelmeiser. Aug. 10, 1936. 479,765.

PRODUCTION OF ARTIFICIAL RESINS derived from polyhydric alcohols and polybasic acids.—Allgemeine Elektricitats-Ges. Aug. 10, 1935. 479,905.

CELLULOSE DERIVATIVE COMPOSITIONS.—H. J. Tattersall, and Imperial Chemical Industries, Ltd. Aug. 10, 1936. 479,772.

NON-DETONATING BLASTING EXPLOSIVES.—A. T. Tyre and Imperial Chemical Industries, Ltd. Aug. 10, 1936. 479,773.

MANUFACTURE OF AZO DYESTUFFS and intermediates.—E. I. du Pont de Nemours and Co., and F. Zwilgmeyer. Aug. 10, 1936. 479,848.

MANUFACTURE OF HALOGEN SUBSTITUTED ALIPHATIC CARBOXYLIC ACIDS and of unsaturated aliphatic carboxylic acids therefrom.—W. W. Groves (I. G. Farbenindustrie.) Aug. 11, 1936. 479,690.

MANUFACTURE OF MERCAPTO THIAZOLES.—Wingfoot Corporation. Oct. 16, 1935. 479,855.

MANUFACTURE OF TRI-FLUOROMETHYLPHENYLSULPHONES.—W. W. Groves (I. G. Farbenindustrie.) Aug. 12, 1936. 479,774.

MANUFACTURE OF ACYL PEROXIDES.—W. W. Groves (I. G. Farbenindustrie.) Aug. 12, 1936. 479,912.

MANUFACTURE OF ORTHOAMINOPHENOLS.—W. W. Groves (I. G. Farbenindustrie.) Aug. 13, 1936. 479,865.

MEANS FOR REMOVING FROM GASES, oxygen or other active gases. W. T. Henley's Telegraph Works Co., Ltd., and P. Dunsheath. Aug. 14, 1936. 479,914.

EXTRACTION OF HEAVY HYDROCARBON OILS with the aid of selective solvents.—H. D. Elkington (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.) Aug. 14, 1936. 479,916.

METHODS OF RECOVERING SOLVENT IN DEWAXING OPERATIONS.—Texaco Development Corporation. Nov. 14, 1935. 479,624.

RESINOUS COMPOSITIONS.—British Thomson-Houston Co., Ltd. Oct. 25, 1935. 479,625.

MAKING POLYVINYL ACETAL RESINS.—Carbide and Carbon Chemicals Corporation. Dec. 14, 1935. 479,548.

MANUFACTURE OF WETTING, sudsing, emulsifying, and detergent agents.—Procter and Gamble Co. Jan. 18, 1936. 479,553.

RECOVERY OF SULPHUR DIOXIDE from gases.—R. F. Bacon. Dec. 24, 1936. (Convention date not granted.) 479,630.

SULPHONIC ACIDS, insoluble azo dyestuffs derived from these acids, and processes for their preparation.—Soc. Anon. des Matieres Colorantes and Produits Chimiques de St. Denis, A. Wahl, and M. Paillard. Jan. 6, 1936. (Samples furnished.) 479,708.

PRODUCTION OF HIGHER UNSATURATED ALIPHATIC ALCOHOLS.—Bohme Fettchemie-Ges. March 16, 1936. 479,642.

SEPARATING NITRILE-HYDROCARBON MIXTURES.—Armour and Co. July 9, 1936. 479,813.

POLYMERISATION OF UNSATURATED COMPOUNDS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Feb. 11, 1936. 479,632.

PROCESS FOR THE MANUFACTURE OF CRYSTALLISED SUGAR.—G. Lambinon. June 8, 1936. 479,585.

POLYMERISATION OF OLEFINES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 19, 1936. 479,657.

PREPARING LIQUID SATURATED HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 16, 1936. 479,827.

GENERATION OF HEAT by chemical action.—B. Dreiding. Nov. 24, 1936. 479,671.

APPARATUS FOR THE PRODUCTION OF CARBON DISULPHIDE.—I. G. Farbenindustrie. Oct. 19, 1936. 479,591.

MANUFACTURE OF ISOCYCLIC COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) June 5, 1936. (Samples furnished.) 479,897.

MANUFACTURE OF ISOCYCLIC COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) June 5, 1936. (Samples furnished). 479,898.

MANUFACTURE OF ISOCYCLIC COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) June 5, 1936. (Samples furnished.) 479,899.

EXTRACTION OF PECTINS.—B. Rosenfeld. May 13, 1936. 480,096.

SYNTHESIS OF HYDROCARBONS UNDER ULTRA-PRESSURE.—E. Fischer and B. Donath. Feb. 15, 1936. 479,931.

METHOD OF PREPARING STABLE EMULSIONS.—A. F. Burgess. (Institute of Paper Chemistry.) June 12, 1936. 480,097.

TREATMENT OF MOLTEN METALS and alloys.—A. Reis. July 8, 1936. 479,933.

MANUFACTURE AND PRODUCTION OF COMPOUNDS of the perylene series.—G. W. Johnson (I. G. Farbenindustrie.) July 13, 1936. 480,162.

PROCESS FOR THE MANUFACTURE OF DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) July 18, 1936. 480,249.

CASE-HARDENING OF CEMENTATION OF ORDINARY OR CHROMIUM STEEL.—L. Renault. Dec. 24, 1935. 480,103.

MANUFACTURE OF BENZENECARBOXYLIC ACID FLUORIDES containing trifluoromethyl groups.—W. W. Groves (I. G. Farbenindustrie.) Aug. 12, 1936. 480,105.

REFINING OF METALS.—W. W. Triggs (Soc. Generale Metallurgique de Hoboken.) Aug. 13, 1936. 480,107.

MANUFACTURE OF AZO DYESTUFFS, and preparations for the production thereof.—A. Carpmael (I. G. Farbenindustrie.) Aug. 14, 1936. 480,169.

APPLICATION OF FORMALDEHYDE-AMINOTRIAZINE CONDENSATION PRODUCTS as binding-agents.—A. G. Bloxam (Soc. of Chemical Industry in Basle.) Aug. 17, 1936. 480,316.

MANUFACTURE OF 2-CHLOR-1.3 BUTADIENE.—J. Eringer. Aug. 17, 1935. 480,320.

MANUFACTURE OF LAMINATED GLASS.—W. W. Triggs (Hercules Safety Glass Co., Ltd.). Aug. 18, 1936. 480,255.

CRYSTALLINE CAST REFRACTORY ARTICLES and their production.—W. J. Tennant (Carborundum Co.). Aug. 18, 1936. 480,256.

MANUFACTURE OF DYESTUFFS of the triarylmethane series.—W. W. Groves (I. G. Farbenindustrie.) Aug. 18, 1936. 480,328.

MANUFACTURE OF KETONES.—W. W. Groves (I. G. Farbenindustrie.) Aug. 19, 1936. 479,939.

PRODUCTION OF HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Aug. 26, 1935. (Sample furnished.) 479,940.

MANUFACTURE OF ACID WOOL DYESTUFFS of the anthraquinone series.—W. W. Groves (I. G. Farbenindustrie.) Aug. 20, 1936. 480,270.

ELECTROLYTIC MANUFACTURE OF HYPOSULPHITE.—A. Carpmael (I. G. Farbenindustrie.) Aug. 20, 1936. 480,334.)

MANUFACTURE OF SYNTHETIC RESINOUS MATERIALS.—H. A. Hampton, A. Hill, E. B. Robinson, and Imperial Chemical Industries, Ltd. Aug. 21, 1936. 480,336.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS of the dibenzanthrone series.—G. W. Johnson (I. G. Farbenindustrie.) Aug. 22, 1936. (Samples furnished.) 480,284.

MANUFACTURE AND PRODUCTION OF PRODUCTS having wetting, emulsifying, and like properties.—G. W. Johnson (I. G. Farbenindustrie.) Sept. 2, 1936. 480,117.

PREPARING FRACTIONS with a melting-point lower than that of paraffin wax from liquid hydrocarbon mixtures.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 3, 1935. 479,957.

TREATMENT OR PURIFICATION OF PRESSED STARCHY-PECTIN-CONTAINING MATERIALS.—G. L. Baker. July 29, 1936. 479,976.

MANUFACTURE OF INTERMEDIATE PRODUCTS and sulphuretted dyestuffs therefrom.—Soc. of Chemical Industry in Basle. March 11, 1936. 480,213.

ELECTRODEPOSITION OF RHODIUM.—Etablissements Marret, Bonnin, Lebel, and Guieu. March 11, 1936. 480,145.

APPARATUS FOR THE HYDRATION OF LIME.—N. V. S. Knibbs. March 22, 1937. 480,215.

PURIFICATION OF 4-AMINO-BENZENE-SULPHONAMIDE.—I. G. Farbenindustrie. April 7, 1936. 480,059.

PRODUCTION OF HYDROGEN PEROXIDE.—Mathieson Alkali Works. June 25, 1936. 479,994.

PRODUCTION AND DYEING OF MATERIALS from cellulose esters.—L. S. E. Ellis (Soc. Rhodiaceta). June 29, 1937. 480,297.

TREATMENT OF HYDROCARBONS in the presence of phosphorous pentoxide.—B. Malishev. May 14, 1936. 480,011.

Weekly Prices of British Chemical Products

THE demand for general chemicals during the past week has not been particularly brisk and in most sections of the market quiet conditions are reported. In regard to contract deliveries these appear to be going forward with fair regularity, and the quantities covered by these deliveries indicate that the general movement of chemicals into consumption has been well maintained. There have been no outstanding price alterations and quotations for general chemicals, rubber chemicals, and wood distillation products continue steady. In the coal tar section a little more inquiry has been circulating, but the actual volume of business remains on a small scale. Carbolic acid crystals and cresylic acid are both steady with supplies of the latter item continuing a little difficult. Pitch is dull at lower values and quotations for creosote are a shade below recent levels.

MANCHESTER.—Fresh buying of heavy chemicals on the Manchester market during the past week has continued on rather quiet lines, but the majority of users are already well bought forward and though there is still complaint in some quarters regarding the rate at which delivery specifications are coming along this is by no means general. Most of the alkali products and the potash compounds, as well as the heavy acids, are being called for in fair quantities and most sections of the market are on a firm price basis. In the case of the tar products, however, weak selling continues to be a feature in some directions, although, generally speaking, the undertone is a trifle steadier than it has been of late. Buying interest as a whole is no more active than it has been during recent weeks.

Price Changes

Falls: Copper Sulphate (Manchester); Potassium Permanganate (Manchester); Creosote; Cresylic Acid, Dark, 95%; Naphtha; Pitch.

SCOTLAND.—Business in chemicals has only been on moderate lines during the week, both for home trade and export. Prices, however, remain very steady with no important changes to report.

General Chemicals

ACETONE.—**£45 to £47 per ton.**

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9½d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £19 5s. per ton f.o.b. SCOTLAND: £19 5s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 12s. 6d. to £5 12s. 6d. per cwt. according to quantity; in drums, £4 5s. 0d. to £4 17s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—**Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.**

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £31 10s.; brown, £1 per ton less. MANCHESTER: White, £33; brown, £32.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£31 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £31 per ton, less 2¼% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £31 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 10s. per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 10s. 6d. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER:

SODIUM CHROMATE.—4½d. per lb. d/d U.K.

4d. per lb. GLASGOW: 4½d. net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

SODIUM PRUSSIATE.—½d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4¼d. to 5d.

SODIUM SILICATE.—£9 10s. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—6s. 6d. to 6s. 9d. per lb.

CARBON BLACK.—4d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5½d. per lb.; dark 4d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—30%, £17 to £17 15s. per ton.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9¼d. to 9¾d. per gal.; standard motor, 1s. 2¾d. to 1s. 3¼d.; 90%, 1s. 3¾d. to 1s. 4¼d.; pure, 1s. 7¾d. to 1s. 8¼d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.

CARBOLIC ACID.—Crystals, 7¾d. to 8¼d. per lb., small quantities would be dearer; Crude, 60's, 3s. 3d. to 3s. 6d.; dehydrated, 4s. 4½d. to 4s. 7½d. per gal. MANCHESTER: Crystals, 7¾d. to 8d. per lb. f.o.b. in drums; crude, 3s. to 3s. 6d. per gal.

CREOSOTE.—Home trade, 6d. to 6½d. per gal., f.o.r. makers' works; exports, 6⅝d. to 6¾d. per gal., according to grade. MANCHESTER: 4½d. to 5½d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5⅝d. to 6¼d.

CRESYLIC ACID.—97/99%, 3s. to 3s. 3d.; 99/100%, 4s. to 4s. 6d. per gal., according to specification; Pale, 99/100%, 3s. 8½d. to 3s. 11½d.; Dark, 95%, 2s. 7½d. to 2s. 10½d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 3s. 3d.

NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1½d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £6 10s. to £7 10s. per ton; purified crystals, £15 10s. per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £16 10s. per ton f.o.b.

PITCH.—Medium, soft, 34s. to 36s. per ton, f.o.b. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. GLASGOW: 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. 6d. to 14s. per gal.

TOLUOL.—90%, 1s. 9½d. to 1s. 10½d. per gal.; pure, 2s. 1½d. to 2s. 2½d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.

XYLOL.—Commercial, 2s. 0½d. to 2s. 1½d. per gal.; pure, 2s. 2½d. to 2s. 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 10s. to £8 per ton; grey, £9 10s. to £10. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

METHYL ACETONE.—40.50%, £35 to £40 per ton.

WOOD CREOSOTE.—Unrefined, 4d. to 8d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—8½d. per lb.

DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 9½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—11½d. per lb., in 8/10-cwt. drums, drums extra.

p-TOLUIDINE.—2s. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BABBITT PRODUCTS, LTD., London, N.W., soap manufacturers, etc. (M., 5/3/38.) Feb. 16, £350 debentures, part of £5,000 already registered.

MOORE AND GEORGE, LTD., London, E.C., analytical chemists, etc. (M., 5/3/38.) Feb. 19, £14,000 debentures; general charge. *——. Dec. 11, 1937.

STANDARD PULVERISED FUEL CO., LTD., London, W.C. (M., 5/3/38.) Feb. 21, series of £42,000 debentures, none at present issued; general charge. *Nil Jan. 5, 1938.

Satisfaction

BAIRD AND TATLOCK (LONDON), LTD., scientific instrument makers and laboratory furnishers. (M.S., 5/3/38.) Satisfaction Feb. 17, of debentures registered. May 24, 1932, to extent of £2,500.

Voluntary Winding-up and Date of Resolution

EMCO DYESTUFFS, LTD. Feb. 18 (members). H. G. Hurst, liquidator.

Declarations of Solvency filed

J. and W. Thompson, Ltd., Sunderland, drysalters and chemists. Feb. 17.

Receiverships

ACME CHEMICAL CO., LTD., of Vale Road East, Tonbridge, Kent. C. J. Maples, F.C.A., 45 London Wall, E.C.2, was appointed receiver and manager on February 18, 1938, under powers contained in second mortgage debentures dated May 8, 1928.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Egypt.—A firm in Cairo wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of carbonate, bicarbonate, silicate and sulphate of sodium, potassium bichromate, potash alum, naphthalene, ammonium carbonate, tartaric acid, sulphate of iron, pure red lead and lithopone. Ref. No. 148.)

Algeria.—A firm in Algiers wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of glue. (Ref. No. 149.)

Egypt.—H.M. Consul-General at Alexandria reports that the Municipality of Alexandria is calling for tenders for the supply and delivery of quantities of pharmaceutical products. Tenders should be addressed to the Director-General of the Municipality, Alexandria, by whom they will be received up to noon on April 20.

Books Received

Intermediate Readings in Chemical and Technical German. Edited by John Theodore Fotos and R. Norris Shreve. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. 219. 9s. 6d.

A Brief Introduction to the use of Beilsten's Handbuch der Organischen Chemie. By Ernest Hamlin Huntress. Second Edition. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. 43. 5s.

Outlines of Methods of Chemical Analysis. By G. E. F. Lundell and James Irvin Hoffman. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. 250. 15s.

The Cause of Cancer. By David Brownlie. London: Chapman and Hall, Ltd. Pp. 208. 7s. 6d.

Semi-Micro Qualitative Analysis. By Paul Arthur and Otto M. Smith. London: McGraw-Hill Publishing Co., Ltd. Pp. 198. 12s.

Practical Organic Chemistry. A. J. Mee. London: J. M. Dent and Sons, Ltd. Pp. 284. 5s.

An Introduction to Laboratory Technique. A. J. Ansley. London: Macmillan and Co., Ltd. Pp. 313. 12s. 6d.

Forthcoming Events

March 6-14.—Leipzig Fair.

London.

March 7.—Society of Chemical Industry. Burlington House, Piccadilly, W.1. 8 p.m. Dr. G. Malcolm Dyson, "The Scientific Basis of Odour."

Royal Society of Arts. John Street, Adelphi, W.C.2. 8 p.m. (Cantor Lecture) Colin J. Smithells, "Gases and Metals" (Lecture II).

University College, Gower Street, W.C.1. 5 p.m. Dr. J. F. Danielli, "Surface Chemistry and Biology."

March 8.—The Institution of Chemical Engineers. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. 6 p.m. J. O. Samuel, "The Theoretical and Commercial Aspects of Flocculation." W. F. Carey, "Size Analysis by Photographic Sedimentation."

The Pharmaceutical Society of Great Britain. 17 Bloomsbury Square, W.C.1. 8.30 p.m. F. W. Gamble, Harrison Memorial Lecture.

Royal Institution of Great Britain, 21 Albemarle Road, W.1. 5.15 p.m. Dr. F. A. Paneth, "Helium as a Clue to the History of the Earth."

March 9.—Electrodepositors' Technical Society. Northampton Polytechnic Institute, St. John Street, E.C.1. 8.15 p.m. R. D. Brown, "Copper Refining."

Association of Scientific Workers. University College, W.C.1. 8.15 p.m. Dr. E. A. Rudge, "Training Chemists for Industry."

March 10.—University of London. University College, Gower Street, W.C.1. 5 p.m. Professor Dr. P. E. Verkade, "The rôle of Dicarboxylic Acids in Metabolism."

March 14.—Royal Society of Arts. John Street, Adelphi, W.C.2. 8 p.m. (Cantor Lecture) Colin J. Smithells, "Gases and Metals" (Lecture III).

University College, Gower Street, W.C.1. 5 p.m. Dr. J. F. Danielli, "Surface Chemistry and Biology."

March 15.—British Association of Refrigeration. Institute of Marine Engineers, 85-88 Minories, E.C.3. 6.30 p.m. Report of the Research Committee on Temperature and Carbon Dioxide Measuring Instruments.

March 16.—Institute of Chemistry (London and South-Eastern Counties Section) London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. Professor J. B. S. Haldane, "Air Raids and Air Raid Protection."

Society for the Study of Alchemy and Early Chemistry. University College, Gower Street, W.C.1. 8 p.m. Dr. R. Campbell Thompson, "Assyrian Chemistry of the Seventh Century B.C."

Birmingham.

March 14.—The Institute of the Plastics Industry. James Watt Memorial Institute. 8 p.m. R. P. Cartwright, "The Behaviour of Plastics Under Various Service Conditions."

Cardiff.

March 11.—The Chemical Society. Joint Meeting with the Cardiff and District Section of the Institute of Chemistry. University College, Cathays Park. 7 p.m. Dr. C. W. Davies, "Strong Electrolytes."

Glasgow.

March 11.—Oil and Colour Chemists' Association (Scottish Section). St. Enoch Hotel. S. R. H. Edge. "Some Problems in the Application of Colours to Paper."

Leeds.

March 7.—Society of Chemical Industry (Plastics Group and Yorkshire Section). University. 7.15 p.m. Annual General Meeting. 7.30 p.m. Dr. F. W. Skirrow, "Vinyl Esters, their Origin, Transformation and Place in the Plastics Field."

Liverpool.

March 10.—Institute of Chemistry. Constitutional Club, India Buildings, Water Street. 7.30 p.m. Dr. L. J. Burrage, "Adsorption by Porous Solids."

Manchester.

March 11.—Oil and Colour Chemists' Association (Manchester Section). A. E. Bevan, "Synthetic Water Finishes."

March 14.—The Institute of the Plastics Industry. Engineers' Club, 17 Albert Square. 7.15 p.m. Prize papers.

Nottingham.

March 10.—Institute of Chemistry (East Midland Section) University College. 7.30 p.m. Professor R. A. Peters, "Brain Bio-chemistry and Vitamin B."

Sunderland.

March 10.—The Institute of Chemistry (Newcastle-on-Tyne and N.E. Coast Section). Sunderland Technical College. Dr. Vernon, "Some Recent Developments in Corrosion Research."

Edinburgh.

March 14.—Institute of Chemistry (Edinburgh and East of Scotland Section). Professor N. V. Sidgwick, "Multiple Links."